

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAY 24, 1954

50 CENTS



## ADDING FUEL TO THE FLIER

Now pilots can fly farther, with greater safety — thanks to fuel stowage advancements by Goodyear.

Drawing upon rubber and fabric experience going all the way back to the days when Goodyear first produced racing balloons, the Aviation Products Division came up with new ways to stow fuel in every available nook and cranny of airplanes—to utilize “free space” and save weight.

This is achieved with a complete line of specially treated, specially constructed, fuel-tight bladder cells which can increase the efficiency and capacity of fuel stowage for all types and sizes of aircraft.

These Goodyear cells not only deliver vast savings in weight, but have extraordinary service life even when compared to metal containers. They are made so that they can be folded and inserted through small apertures into spaces where fuel stowage was hitherto impossible. Some of great capacity — yet weighing only .10 to .34 lbs. per sq. ft. — are used to increase the fuel load of our largest, long-range aircraft.

In addition, Goodyear Aviation Products Division builds every type of rip-ram-proof, multi-plex and bullet-sealing\* fuel tanks to meet the specialized needs of military and commercial aircraft. Goodyear, Aviation Products Division, Akron 16, Ohio and Los Angeles 54, California.



*\*The first successful tank of this type was pioneered by Goodyear in 1920*

FACILITIES + ABILITIES = EXTRA *plus* IN PERFORMANCE

# VISIBILITY by Sweetlow

IN THE NAVY HOK-1 HELICOPTER



The Navy's newest helicopter, the HOK-1, manufactured by the Kaman Aircraft Corporation, is a low-gloss, high performance aircraft used as a general utility helicopter and aerial ambulance. New types of aircraft present difficult engineering and optical problems in enclosures, which Sweetlow specialization in transparent glazing applications is called upon to solve. The transparent enclosure of the HOK-1 is an extraordinary example of Sweetlow's precision engineering and production.

**Sweetlow**  
PLASTICS CO.

LOS ANGELES, CALIFORNIA • YOUNGSTOWN, OHIO



"I only fly 'em, baby! You'll have to ask the man from Fafnir about that."



Fafnir B&B Ball Bearing  
Ball Capacity, Self-aligning  
Ballroom Control Bearing

A well-informed approach to advanced aircraft design problems — based on a quarter century of specialization in the design and development of aircraft bearings — is an asset you can count on in every Fafnir Bearing Engineer. Typical result of this approach is the B&B Series Airframe Control Bearing, which simplifies and improves control systems in high speed aircraft. The Fafnir Bearing Company, New Britain, Connecticut.

## FAFNIR AIRCRAFT BEARINGS

*FIRST... at the turning point  
in aircraft design*



# NUPLA soft-faced MALLETs

last up to  
30 times longer!



The only  
mallets  
supplied in four  
hardnesses to  
meet *All* your  
pounding needs.

...Made of  
super-lasting  
NUPLAFLEX

Heads will not mushroom, chip or flake. Lack of protruding parts prevents sparking—makes all head surfaces usable. Choice of hard, tough, medium or soft heads. Four sizes, from

star and ribbed, and perfect balance are features that mean faster, more consistent and better work. Ask your distributor for an on-the-job test—or write for catalog information.

Check  
These  
Quality  
Features

Massive, Powerful Heads  
Conventional Weights,  
4 to 15 lbs.  
Four Sizes  
Perfect Balance  
GUARANTEED

246



**NEW  
PLASTIC  
Corporation**

100% No. 5000, Los Angeles 26, Calif.

# Aviation Week

MAY 24, 1954

Vol. 46, No. 21

Official Office

New York 26—110 W. 40th St., Room 1405, New York 18 4-3633  
Washington 4, D. C.—National Press Bldg., Room 4000 3-3414  
Los Angeles 17—1111 Wilshire Blvd., Room 4000 8-0222

Table of Contents on Page 2

\$3.15 per copy of this issue printed

Robert W. Martin, Jr., Publisher

Robert H. Wood, Editor

Robert S. Ebert, Executive Editor

Chief W. Ebert	News Editor	Ernest J. Bulfinch	Special Assignments
David A. Anderson	Engineering	William J. Coughlin	West Coast
Living Stone	Torpedo	Bruce Lang	West Coast Assistant
G. L. Chubb	Equipment Maintenance	Harry Latta	News Desk
Katherine Johnson	Copiers	Gordon C. Carter	News Desk
Philip Klein	Aircraft	G. J. McWhorter	Washington News Desk
Charles D. Watts	Military	Laurance J. Smith	Art Editor
Richard Salomon	Transport	Victoria Gresham	Editorial Secretary
Frank Ross, Jr.	Transport	Leo T. Torrey	Printing & Production

Media H. Mickel, Administrative Assistant to the Editor

## DOMESTIC NEWS BUREAUS

Atlanta 3	491 N. Peachtree Hwy.	Houston 18	1109 Railroad St.
Chicago 11	523 N. Michigan Ave.	Los Angeles 17	1111 Wilshire Blvd.
Cleveland 15	1910 Huron Blvd.	San Francisco 4	58 Post St.
Detroit 25	435 Franklin Blvd.	Washington 4	1119 National Press Bldg.

## FOREIGN NEWS SERVICE

London	Joseph K. Van Dine, Jr.	Mexico	Herbert Leopold
Paris	Edward W. S. Hall	Moscow City	John Wilhelm
San Francisco	John D. Clappard	San Paulo	Loren J. Holmes
Seattle	Gerald W. Schoen	Tokyo	Alfred W. Joseph

Aviation Week is served by Press Associates, Inc., a subsidiary of Associated Press

Research and Marketing; Mary Eberley, Jane Gable and Mary Whitely.

J. G. Johnson, Business Manager

T. S. Olsen, Production Manager; W. V. Cochrane, Production Manager

Sales Representatives: J. C. Anderson, New York; H. P. Johnson, Cleveland; D. T. Benson and J. S. Corbitt, Chicago and St. Louis; E. P. Emerson, Jr., Boston; James Cobb, Dallas; William D. Levin, Jr., Atlanta; R. S. Darnell, San Francisco; C. P. McLaughlin and Gordon Jones, Los Angeles; W. S. Henry, Philadelphia; C. A. Barrett, Detroit. Other sales offices in Pittsburgh, London.

AVIATION WEEK • MAY 24, 1954 • Vol. 46, No. 21  
Member AIE and ABC

Published weekly by AVIATION WEEK, Inc., 1111 Wilshire Blvd., Los Angeles 17, Calif. Publisher: Robert W. Martin, Jr. Editor: Robert H. Wood. Executive Editor: Robert S. Ebert. Managing Editor: Ernest J. Bulfinch. Business Manager: J. G. Johnson. Production Manager: T. S. Olsen. Circulation Manager: W. V. Cochrane. Advertising Manager: Mary Eberley. Jane Gable and Mary Whitely. Sales Representatives: J. C. Anderson, New York; H. P. Johnson, Cleveland; D. T. Benson and J. S. Corbitt, Chicago and St. Louis; E. P. Emerson, Jr., Boston; James Cobb, Dallas; William D. Levin, Jr., Atlanta; R. S. Darnell, San Francisco; C. P. McLaughlin and Gordon Jones, Los Angeles; W. S. Henry, Philadelphia; C. A. Barrett, Detroit. Other sales offices in Pittsburgh, London.

NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD

## salty vets and sleek new jets



These North American airplanes  
help the Navy in its vigilant  
defense of the seas.

 <p><b>A-1 Skyraider</b>—Heavy version of one of the most versatile and dependable of all troop planes... the world's famous A-1, served with 35 Allied nations during WW II, proved effective tactical ground support in Korea. Recently put in at sea service.</p>	 <p><b>A-1 Skyraider</b>—Builder of many Navy "birds"... the A-1 Skyraider... the first Navy plane designed to use the A-1... and first plane of its own to land as a "hot" ship... Working in at 15 tons, unleashing the Savage in response to 1 jet and 2 support jet engines and a constant crew of 2.</p>	 <p><b>A-1 Skyraider</b>—The sleek, modern version of the A-1... first version in the A-1... Every jet plane, but it's all with it... the "A-1" can fly high or low, can take pictures at any time... day or night... with special night vision equipment it is its own day.</p>
 <p><b>F-4 Phantom II</b>—New specification with the Navy... this new Phantom has a top speed of 245 MPH and a maximum ceiling of 35,500 feet... New Phantom is built for the Navy and Navy training purposes. The F-4 was designed for maximum efficiency in training new pilots... incorporating many innovations.</p>	 <p><b>F-4 Phantom II</b>—New Navy F-4... 18,000... this new Phantom has a top speed of 245 MPH and a maximum ceiling of 35,500 feet... New Phantom is built for the Navy and Navy training purposes. The F-4 was designed for maximum efficiency in training new pilots... incorporating many innovations.</p>	 <p><b>F-4 Phantom II</b>—One of the Navy's newest... most modern fighters... with speed in the high subsonic range, high rate of climb and superb maneuverability... built as North American's 11 Series of carrier-based fighters, the F-4 will soon be accepted as fleet duty.</p>

Engineers: No. 21 American aircraft engineers specialized in qualified engineers seeking a challenging future. Write: Engineering Personnel Office, North American Aviation, Los Angeles or Beverly, California, or Columbus, Ohio.

organization, facilities and experience keep

## North American Aviation, Inc.

years ahead in aircraft... atomic energy... electronics... guided missiles... research and development

## On the new F-89D Northrop Scorpion...



Scorpion went in a flash of fire from the U. S. Air Force's Northrop Scorpion F-89D during combat over the Southeast Asian coast.



Thermoflex Thermal Insulation is flexible being applied to jet engine exhaust system. Thermoflex provides superior protection against heat, vibration, corrosion and impact damage. It is available in many thicknesses.



Typical preformed shapes of Thermoflex, custom made to insulate the interior and when required reduce heat loss in many aircraft applications.

## J-M Thermoflex Insulation controls searing heat of twin jets

The new F-89D Scorpion—rocket fighter, twin jet, all-weather interceptor—was developed for the Air Force by Northrop Aircraft, Inc.—it is equipped with Thermoflex® High Temperature Thermal Insulation blankets for all engine protection.

Thermoflex insulates the shaft housing of the F-89D's jet engine against searing heat—helps keep oil and bearing temperatures down to a safe level.

Thermoflex blankets, in sheet form, protect on many jet parts and many are custom made. The condenser filter is made from highly stable Thermoflex RP Fe. The newly developed refractory fiber felt insulation is used between sheets of corrosion-resistant metal foils.

During manufacture, careful attention is given to the accuracy of cutouts for engine supports, exhaust access-

ways, fuel lines, thermocouple leads and other details. Edges at corners are sealed to prevent fuel penetration into the felt insulation filter. This process fabrication of Thermoflex blankets assures maximum resistance for the entire application.

In addition to insulating blankets for tail pipes, engine nozzles, exhaust stacks and afterburners—Thermoflex is also made in special preformed shapes in round, precast and knurled foil storage tanks, air-cooled cooling systems, thermal deicing ducts and many other assemblies in all types of aircraft.

For the complete story of Thermoflex Insulation for aircraft power plants and accessories, send for illustrated folder JN-135A, Addressee: Johns-Manville, Box 50, New York 16, N.Y. Or Canada, 159 Bay St., Toronto 1, Ont.

**Johns-Manville** PRODUCTS for the  
AVIATION INDUSTRY

## NEWS DIGEST

### Domestic

USAF has cut sizeable aerial role on C-14 transports leased to airlines to \$5,100, including engine and \$7,200, source says. Previous prices \$12,500 and \$11,400, respectively. After World War II USAF leased the C-14 for about \$5,000 a month with even lower rates for veterans. Prices were raised last fall.

Lt. Gen Samuel E. Anderson is the new director of the Defense Department's Weapons System Evaluation Group, and the first Air Force officer to hold the post. Commander of the F-40 Air Force in Korea since May 1955, he succeeds Lt. Gen. Geoffrey Keyes who is retiring Aug. 1.

Charles E. Kihlengren, 54, is elected to the president of North American Aviation, Inc., and associated with the firm since its founding in 1935, died last week. He was a member of J-B Kihlengren, NAA board chairman.

Republic F-80S has scored a step closer to testing and manufacturing phases with movement of the project's engine team. New York City office to complete the Fairchild, L. I., N. Y., case plan.

Former Rep. Clarence Lee, who served two years as chairman of House Interstate and Foreign Commerce Committee, 1957-61, has announced his intention as director of government's national aviation administration in the Department of Defense.

Shelton transition able to operate in 100-150C temperatures is considered an aircraft, are available in production quantities from Texas Instruments, Inc., Dallas. Availability of unproduced aircraft materials should require major better to transfer use of the system into replacement. Several other manufacturers which had earlier announced experimental aircraft transition.

Navstar West March 12, 71, apparently have not yet selected pilot/aircraft platform.

Dean Panchas, 46, chairman of the board and founder of Columbia Air Corp., owner Second Aerospace Machine (SAM), was killed in the crash of a small plane.

Gibson S. Dumas says the petition in insolvency bankruptcy filed recently by three creditors against Dumas Hall-



### French Test New Sportplane

First prototype CBR (Borel) Sportplane has been instrumented fully for instrument flight test program at Villeneuve, France and will be speeded along by the second and third of the series. The small two-seater is powered by a 90-hp. Continental engine and has a design top speed of about 165 mph. Gross weight is approximately 1,250 lb. Wingspan is 36.5 ft. It has retractable tricycle landing gear.

engine, Inc., (American West May 17, p. 7) has been designated as the Federal Government's Defense Department's American West that the aircraft for the pet projects have stated that "in the light of information that has come in from the past week," they have no intention of doing any other project.

Sen. Eric Sorensen, appointed to fill the vacancy caused by the recent death of Nebraska's Sen. Dwight Crisswell, has been named to the Aviation Sub-committee of Senate Interstate and Foreign Commerce Committee. The subcommittee has been inactive since aviation hearings are being held before the full committee.

Low-cost (\$37,500) "Dumbbells" for use in development, precision approach, high-lift and many other tasks at smaller airports has been developed by California firm, Los Angeles. It is a modified B-1A, recently converted by Laboratory for Electronics (Aviation West May 1, p. 58), but has added features including full 160-degree omniscience. Company's new Quadron will be in quantity production within 30 months.

### Financial

Flying Tiger Line has declared its 1960 year-end 25-cent dividend on 1/8 percent stock. Stock is payable June 15 to holders of record May 18.

Western Air Lines reports net income of \$770,000 for last quarter compared with \$90,313 for the comparable period last year. Earnings for the year ended Mar. 31 totaled \$1,261,212, slightly more than 3 1/2% higher than in the prior year. First quarter earnings are reduced from receipt of nonoperating

items of special income which more than offset a loss from normal operations of \$121,488.

Marquardt Aircraft Co., Van Nuys, Calif., reports a net income of \$759,480 for 1955 compared with 1954 earnings of \$136,808. Sales in the year just reached \$9,831,000, up 31% from the previous year. All-time high backlog, \$15,000,000, not including about \$1 million in new contracts being negotiated. Firm is asking stockholders to approve increasing dividend of 51 per cent, eight cents from \$10.00 to \$15.00.

National Airlines reports net income of \$1,213,494 equal to \$1.23 per share, for its third quarter ending Mar. 31. For the same period last year, National reported a net income of \$1,073,618 or \$1.19 a share.

### International

Second Danish Mystery 48 single seat French jet fighter is scheduled for first flight in early June. First Mystery 48 crashed Apr. 5 during test pilot Col. Kessel's (Aviation West Apr. 12, p. 7). The two-place eight fighter Mystery 4N is being completed and is expected to fly shortly after the second 48.

DFI Comet 1 is undergoing flight tests in an attempt to find the cause of the crash which have resulted in the transport being withdrawn from commercial service, the manufacturer reports.

Bugatt 351 Provence has passed acceptance tests which permit increase in payload by 25% and range by 40%. Air France is ordering all of its Provences to meet the new allowed performance.



## INDUSTRY OBSERVER

■ Sikorsky is making rapid progress on its new engine S-55 production. Four military transport versions of the S-55 are now being at Hagerston, Conn., with another two will follow the production line.

■ Chrysler expects to get into production on the Army's Redstone ballistic-type homelander missile early next year. Meanwhile, Redstone has entered the flight test stage.

■ Ford C-123 aircraft is expected to be built by Fairchild at its Hagerston, Md., plant is scheduled to roll out in July. It will be a composite of parts built by Kaman at Willow Run and by Fairchild. Regular C-123 production at Hagerston is scheduled to begin in early fall.

■ New York Airways has arranged a complete replacement on its Sikorsky S-57 helicopters every 170 hr. Out of 25 normals in 5,300 hrs, only five were pulled on schedule at rate of engine overhaul. Five believe cause of two engine life is vibration.

■ McDonnell Aircraft's XV-1 convertiplane is in the windtunnel at Moffett Field, Calif., for tests that will last about a month. There is a possibility that McDonnell pilot John Nard will fly the aircraft in the tunnel for his first hands-on with the controls. First test flight will be this summer at St. Louis.

■ Sikorsky has a new blade design for the H-19 (S-55) helicopter with a fatigue life two to three times that of the current model. Company claims, however, that better ease, maintenance and loading of present blades will accomplish same benefits resulting from new design.

■ Military electronic countermeasures development is lagging seriously, but there has been "amazing progress" in the past few months, Maj. Gen. C. S. Lewis, deputy commander of the Air Materiel Command, told the recent Dayton, Ohio, conference on electronic electronics.

■ Army claims commercial operation success over high altitude noise level of helicopter. Col. William B. Bunkley, Assistant Chief of Transportation for Army aviation, told manufacturers that his service feels that the lower noise level rather than lower fuel consumption is the major argument in favor of continuing to use piston engines on helicopters rather than jet jets.

■ General's TC-131C, the CV-340 powered by two Allison T38 turboprops, was scheduled to make its first flight at Fort Worth, Tex., last week.

■ Air Force has achieved its first airborne early warning decision, equipped with Lockheed RC-121C Super Constellation. The airborne warning units will operate off both the East and West Coasts to control radar coverage around Taiwan headquarters is at McChesney AFB, Calif., near Sacramento.

■ USAF plans to activate four additional downrange stations and six radar direction-finding sites for the operation of the Missile Test Center at Patrick AFB, Fla. Four new stations will be located in the Dominican Republic, Puerto Rico, Santa Lucia and Ascension Island.

■ Jet fuel costs the Air Force \$9.40 a barrel and reticulating that, \$7.70 a barrel, USAF is scheduled to obligate \$560 million in fiscal 1975 for the purchase of aircraft fuel and oil, including liquid rocket fuels. Approximately \$475 million will be obligated in fiscal 1976.

■ Corrosion is a major problem in the operation of helicopters from Navy carriers. Recent report reveals that a helicopter flying 56 hr in 70 days requires 718 man hours at work to repair damage to the airframe caused by salt water.

■ Chance Vought F7U-3 Corsair Navy jet fighter is equipped with a new under-belly rocket pack containing an underbelly motor of 2,750 cc, six to six Michio Mewer pistons. Plans also call for two rocket pods on its wing pylons. Belly pack is accurate and can be attached after firing.

## WHO'S WHERE

### In the Front Office

Gen. John E. Cassano, (USAF, Ret.), has been chosen chairman of the board of Fletcher Aviation Corp., Pasadena, Calif. Maj. Gen. Leroy H. Warren (U. S. Army, Ret.) has been appointed secretary to the president of Fletcher. He will act in addition as new military products. One of his first projects will be to handle administrative reorganization of Telen Aircraft Co., Tulsa, Texas, which is licensed to build and sell the Fletcher FD-15 tactical plane in the (U.S.). E. G. Ackerman has been named president of McCawley Industrial Corp., New York, aircraft people firm. (U.S. F.) Fourth has been appointed secretary to the president. John F. Brown is now new president of that company. Charles J. Schuler is the new secretary-treasurer and Walter Vinson is full engineer and will handle sales and training and service. Henry Katsman and Sidney M. Gorman, former president and general manager respectively, resigned. Eugene F. Hotchell has been appointed a vice president of Veto Corp. of America in charge of new products and will have his office in New York.

### Changes

William E. Geller has been appointed product manager of division, based, editor and assistant secretary of B. F. Goodrich Co. a Tex. B. Equipment Division, Akron, Ohio. Also named to product manager post: Louis J. Foley, Newark, Ohio; Robert J. Kelly, member firm, Tulsa and re-appointing; Edward G. Sullivan, Tulsa, Okla.; Glenn A. Greenhouse, Tulsa, Okla.; and James H. N. Smith, a regional operating manager. E. L. Wells has been appointed assistant chief engineer for Manufacturing Electric Corp.'s Airplane Gas Turbine Division, Philadelphia, Pa. W. A. Day has been named to the new post of executive engineer and is the temporary head of experimental operations. New managers and their departments: named as a replacement of the engineering department of NCR: G. W. Shultz, assigned to development division; A. H. Ball, design, performance, design; R. S. Radden, design; William E. Geller, engineering; and C. S. Cook, manufacturing and test and service. L. M. Hoffmann is new manager of operations and R. R. Arnold is manager of foreign relations and administrative assistant.

### Honors and Elections

William B. Bunkley, Dayton, Ohio, Air Force engineering test pilot, has received the Flying Sign Pilot Trophy, presented every two years by members of the American Volunteer Group (Flying Tigers) to a pilot who is credited for outstanding achievement in aviation. Bunkley received the award for pioneering flight in the Douglas Skyrocket and X-3 research planes.

Col. William M. Williams, KSC, has been made a distinguished honorary member of the 1st Phoenix Arm of the USAF as the representative flight of 4 to 4 mile is a North American F4U Super last January.

## "Missile Launched"

Deadly, tough and reliable, Chance Vought Redstone guided missiles are prime examples of the type of modern weapons going into the U. S. Navy's arsenal. Versatile as well as potent, they can be launched in enemy targets from submarines, ships at close range.



**Chance Vought Aircraft**

DALLAS, TEXAS

INCORPORATED



ROCKET-1 with its eight 100 lb. boosters, is shown in its launching position in the engineering drawing.

## Missile with a "one track mind" ... Bomber Defense

Defensive guided missiles launched from supersonic aircraft will depend upon electronic controls that come as close to simulating human intelligence as any mechanism ever devised. Important functions of these "weapons of the future" are typical of those entrusted to systems made by Arma Corporation.

Complex electronic and electro-mechanical con-

trols from Arma are an integral part of many of America's most advanced weapons. In basic research, design, development and manufacture, Arma Corporation has worked in close cooperation with the Armed Forces since 1910—and more recently, the Atomic Energy Commission, Arma Corporation, Roslyn, N. Y.; Hercules, N. Y. Subsidiary of American Bosch Corporation.

**ARMA**

ADVANCED ELECTRONICS FOR CONTROL



# AVIATION WEEK

VOL. 49, NO. 23

MAY 24, 1954

## New Highspeed Bomber

## AF Speeds B-58 Development Program

- Tillbott reveals \$100-million-a-year schedule for development of supersonic XB-58 to replace B-47.
- Project faces major technical hurdles, including radical delta design, powerplants, air refueling.

By Robert Harp

USAF has reached a top-level decision to give high priority to research in its supersonic bomber development program after nearly a year of Air Staff debate over its future.

The USAF decision was made only a few weeks after the first public appearance of two new Russian jet bomber types over Red Square in Moscow during the annual May Day air show on May 1 (Aviation Week May 10, p. 34).

The new bombers are the Soviet XB-58, also known as the Hustler. It is a delta-wing design, aimed at operating in the supersonic speed range of about 1,600 mph. It will employ ramjet and turbojet design features and undoubtedly will be armed with atomic or biological bombs.

**Tanker Problem.**—The Hustler is scheduled to be powered by an extremely high power turbojet and is under development work at the General Electric JV which is aimed at producing about 15,000 lb. thrust.

Development of the Hustler first was announced by the Pentagon in December 1953 (Aviation Week Dec. 8, p. 11, and Dec. 22, 1953, p. 10). The project is being handled by General's PL Wright Division where the B-35 is scheduled to succeed the B-36 in the production line of the post-government-owned plane.

The Hustler development program was given to development of a new type of jet bomber powered by ramjet and turbojet engines. This phase of the program has been assigned to USAF's Douglas Aircraft Co., Inc. for the development of the G132 turbojet engine, to be powered by two Pratt & Whitney J45 turbojet engines to deliver extremely high power.

**Boeing Development.**—Boeing Aircraft Co. also has remained in the competitive picture with a supersonic bomber development program at its Wichita plant and the Boeing Model

737 Stratojet tanker-transport prototype aircraft completed at the Seattle plant (see p. 16). There are no official relations from USAF on the military future of these two Boeing developments.

Pentagon reports estimate that the Hustler development program, both technically and financially is one of the most formidable that USAF ever has tackled.

USAF Secretary Harold E. Tillbott said at an Annual Forces Day speech in New York:

"We will spend about \$100 million annually in the development of a new supersonic bomber to replace the B-47."

Most Pentagon experts agree that the total development bill will come to many times the \$100 million annually mentioned by Secretary Tillbott for only the bench phase of the program.

**Hustler Problems.**—Technical hurdles that must be surmounted by the program include:

- Radical airframe design features that will enable the Hustler to operate at supersonic speeds.
- Development of new techniques for fuel tank fuel trucks.
- Development of the 100,000-lb.-payload tanker transport.
- Development of two completely new powerplants—the G132 turbojet and the B-75A 737 turbojet.

Major opposition to the Hustler development program has been led by Gen. Curtis E. LeMay who, as chief of the Strategic Air Command, would be the chief user of the B-75. LeMay now is supporting the decision to proceed with B-75 development.

Pentagon observers regarded the long debate over the future of the Hustler program as one of the most significant military struggles of the postwar period because the debate of USAF's capability to deliver atomic and hydrogen bombs to the Russian homeland was involved. It has been so recent that the development program has slowed while Har-

ley's future was being debated at USAF's highest level.

**Contractor Policy.**—Pentagon reports that the prototype XB-58 is likely to fly next year as regarded as extremely optimistic in the Pentagon.

The Hustler development program was the first practical application of the single-contractor policy sponsored by the Air Research and Development Command for new air weapons systems (Aviation Week Aug. 17, 1953, p. 41). Under this policy, General was assigned responsibility for contracting with other firms for development of all major sub-systems required for the strategic bombing system except the powerplants. USAF still bought engine development directly and supplied powerplants to General in government finished equipment.

The original single-prime-contractor policy was later modified by USAF to expand the list of equipment that will be GPO and reduce the quantity of equipment produced directly by the prime contractor (Aviation Week Dec. 12, 1953, p. 32).

General's division has been contracted for several of the major sub-systems involved in the Hustler program. These include:

- Sperry Gyroscope Co., bombing and navigation systems.
  - Bendix Aviation, autopilot and control system.
  - Emerson Electric, measurement phase of defense system.
  - Sperry Corp., detection phase of defense system.
- The XB-58 will be the first USAF bomber capable of operating at supersonic speeds.

The Douglas B-66, the F-100 and B-52 all operate in the higher subsonic speed ranges.

## New Learstar Flies

First production Learstar business plane (previously Lockheed B3 Loado) also made its initial flight May 18. In one climb test at 23,000 ft. gross weight, the Learstar attained 18,000 ft. altitude from standing start at an level in 5 min. 51 sec. Powered by two 1,425-hp. Wright CR5HDs, the Learstar is designed for normal cruise speed of about 100 mph. Contractor is Lear, Inc., Santa Monica, Calif.



TALLOTT



TWINING

## AF Cites Red Bomber Progress

Gen. Twining warns that new strategic jets displayed at May Day show pose threat to U. S. defense.

Top USAF leaders sharply warned last week that the Russians are progressing rapidly on their program to build a fleet of long-range jet bombers capable of delivering atomic and biological bombs to American targets.

Significant details on three new Russian bomber developments, displayed publicly for the first time at the Moscow May Day air show, were expounded in Armed Forces Day speeches by Gen. Nathan F. Twining, USAF Chief of Staff, and Harold E. Talbot, Air Force Secretary. Cited by these USAF leaders in warnings about the Russian march to create a strategic air force:

- New heavy jet bomber prototype comparable in size and general appearance to the Boeing B-52 Stratofortress.
- Sighting of new medium jet bombers comparable in size and general appearance to the Boeing B-47 Stratojet.
- New and extremely powerful anti-flow fuelburn engines powering both the new heavy and medium bombers.

Gen. Twining, speaking in Anzures, Tex., and the USAF problem of staying ahead of the Russians air force was becoming more difficult every day.

"The Soviet air force is advancing rapidly," he said. "It is by far the largest air force in the world. In numbers of combat planes it far exceeds the U. S. Air Force. In fact the Red has thousands of more planes than USAF, Navy, Marines and Army combined."

• Progress Chief—"We have almost ceased on having superior planes and superior crews. The Reds, however, are trying hard to overtake us in quality as well as quantity. They are making progress. Right now they want us to know they are making progress," Twining said.

Last week's jets they studied some of their latest models of aircraft in flight over Moscow. For the second time their annual air parade was made up entirely of jets. Last year they showed only seven proposed MIG fighter planes and light jet bombers. That study had thousands of those in their capital tents so we were not surprised.

"This year, however, they revealed something very new. In the air parade they included nine new medium jet bombers comparable in size and design to our own B-47. Even more significant was the new heavy jet bomber they displayed for the first time in flight."

Actually this heavy bomber is comparable in size and appearance to our own B-52.

"We have to get only a few B-52s," he pointed out.

"The Red has proved to the world that they have at least one long-range jet bomber of a similar type."

"It is interesting to note that both the new heavy bomber and the new medium bombers of the Red are all equipped with extremely powerful engines embedded in the wings."

"Neither of their new jet bomber types is necessary for use by the Red against the free countries near the Iron Curtain. In fact these medium bombers can reach any important target in Europe, Asia or North Africa."

"They would need the new heavy bomber only to reach important targets in the United States."

The Air Force Chief of Staff stated:

"There is no question that the Red is more anxious for the representatives of other nations in Moscow to see their new bomber. They advanced the show several times and shows they very low."

• Secret intention—The Air Force Chief stated: "Red of these new bombers had been carefully hidden up to that time. That the Reds intend to progress and to frighten us with their sophisticated progress and with the advanced design of their new jet bombers and their new jet aircraft at once."

"That they should expose their previously guarded secrets of technological achievement at this time of international crisis is significant. It is a significant because the cold war is to a very large extent a war of nerves. If it can bring about loss of nerve among us and our allies—if they can cause any relaxation of our courage and firmness, the Kremlin will use another opportunity to victory without the risk of military action."

"The Red now is hoping to produce a degree of discouragement and despair over in the United States. They know that their progress in language, air power is likely to cause uneasiness here in this country."

• U. S. Lead—"I am sure they hope our superior will be in the direction of increased from our industrial production. I am also sure that the people of the United States need not and will not rest in the way they would like us to rest."

"The Red still have a considerable lead over the Red in long-range progress as well as in respect that can be delivered by long-range progress. We can maintain the advantage if we are willing to pay the price in material resources and in the human resources of hard work."

Gen. Twining's description of the new Russian jet bombers and their significance was echoed by Secretary of Defense Harold G. George. He said the U. S. Air Force Secretary, Deputy USAF Chief of Staff for Materiel, in Los Angeles.

## Capital May Test Viscounts in U. S.

Capital Airlines will be the first U. S. domestic airline to fly British aircraft if a reported deal goes through between the company and Western Airlines Ltd. for the long-range Viscount.

Industry sources report that Western is anxious to give Capital at least one Viscount on a contract basis. If Capital decides to lease the aircraft, it could help overcome the fleet shortage that is being suffered by the company. Reports say that Capital may get three Viscounts.

• CAA Times on England—Last week J. H. Carmichael, Capital president, was in England with Capital's general counsel, Charles H. Marshburn, reportedly completing the deal. They were accompanied by three other Capital officials. Observers report Western to make the South American transport market.

by selling the Viscount to the government-controlled Air France airline (Associated Press Wire May 17, p. 14).

Meanwhile, a Civil Aeronautics Administration committee group headed by W. H. Wells, head of CAA's Civil Engineering Division, is in England studying the Viscount for possible U. S. certification. An interim order at the invitation of the British Air Registration Board when Trans-Canada Airlines, an irregular airline, asked for Viscount certification so it could use two of the British transports.

• Red-Rose England—The Viscount was pictured and described in engineering detail in Associated Press Wire May 11, 1953 (p. 28). Present Viscount as owned by four Red-Rose, that the biplane of 1-480 hp also 165 lb thrust. Cost is about \$750,000.

British Transport Airlines, which has been flying the Viscount in scheduled service since then, says, over 40,000 per cent, but return on order run up to 52 cents.

## New Civil Air Law Hearings Continue

The Administration testimony is scheduled to present and defend its policies on civil aviation to the Senate Interstate and Foreign Commerce Committee next week in connection with the so-called McCarran bill covering air law.

• Continuing Schedule—The committee's chairman, Sen. John F. McCarran, has requested the Bureau of the Budget to have representatives of these departments appear.

May 25—Commerce Department, Bureau of the Census, Civil Aeronautics Administration, State Department.

May 26—Post Office Department, Defense Department, Labor Department.

June 1 and 2—Civil Aeronautics Board.



## DH Ralls Out Comet 3 Trans-Atlantic Jet Transport

Prototype of the Comet 3, latest and largest of the Comet series, is being washed by English trials before being sent to Hants, England. Powered by four built

The Justice Department, Interstate Commerce Commission, Interior Department, and Securities & Exchange Commission will be required to testify.

The committee has set June 14 and 15 for informal testimony on the views presented by the government witnesses. Developments at the last session on the McCarran bill, before the Administration witnesses, were:

Robert F. Taft, president, Flying Tiger Line, argued that restricted air freight carriers be granted the right to cross and across a subsidy.

Declaring that "it is inconceivable that the so-called conspiracy against rates of 45 cents a ton-mile could be held to be a case of monopoly," Taft said the committee should "cancel and not permit this but in other type of cargo—so that the cargo with the lowest cost to the carrier."

There is no such expense, there are no packing and delivery problems, there is no "milk run."

Saying that he has no way to "ending a government monopoly," Taft argued: "If we can get the right to subsidy, which our competition have, we believe we can get some of their subsidies, perhaps. Once they realize they can't bankrupt us, they will stop working money trying."

Worms Lee Farnes, chairman of the board of Trans World Airlines, argued tighter regulation of airlines.

"Unfortunately the present law does provide upon strong administration of some very flexible provisions in order to accomplish the desired regulation as the public interest," and the statute has been much to be desired," he said.

Charles S. Ryan, president, Air Line Pilots Assn., supported replacement of Civil Aeronautics Administration and Civil Aeronautics Board with a civil aeronautics authority and independent safety board, as proposed in the McCarran bill.

Meanwhile, the CAA is busied with economic problems demanding primary consideration that little time for safety is left to be devoted to both and air safety problems," he said.

Seven justified industry to the airlines as the national defense interest. The speed permanent facilities for local service lines to stabilize the interest of the industry and encourage its development.

## Subsidy Bill Aims To Clarify Offsets

Legislators to overcome the effect of the Supreme Court decision requiring airlines to offset subsidy payments on one segment with profits from another segment has been introduced by Sen. Pat McCarran.

The bill authorizes Civil Aeronautics Board to establish different rates "for different classes of service, including differential operation on geographical divisions."

• For Decision—The Supreme Court decision was rendered in a Dallas-Chicago Southern Air Lines case denying \$104,000 back under pay and reimbursement that the 1938 CAA Act subsidy must be measured by the "industry" of an airline's operation (Associated Press Wire May 13, p. 11).

An opinion by Civil Aeronautics Board mentioned that the decision would reduce the subsidy program of only one of the seven affected—Trans World Airlines—Associated Press Wire May 13, p. 12). The other carriers are Boeing Airways, Alaska Airlines, Colonial Airways, Northwest Orient Airlines, Pan American World Airways, and Delta-Chicago and Southern.

North American Airlines will not attempt to repair the 727-300 Super Silver currently badly damaged during an emergency landing at Edwards AFB, Calif.



Boeing 707-120 has 160 seats of approximately 6,000 lb. short end, the Comet 3 is designed for trans-Atlantic service and can carry about 18 to 25 passengers. Passenger is 112 ft. long compared with 90 ft. for earlier 310 Comet 1. Note auxiliary fuel tank protruding from wing leading edge near the tip.





INTO THE SUNLIGHT at Renton, Wash., rolls the yellow, rhinoceros and silver Boeing 707 jet transporter prototype.

## Boeing 707 Rolls Out; First Flight Near



TRANSPORTER WING shows military B-52-type model system having spines and tail open inboard. Wing also appears to have outboard ailerons in normal position.

Boeing Airplane Co. rolled out its \$15-million investment in the future of jet transport—the 707 jet Starliner—two months ahead of schedule, ran it at Renton, Wash.'s end.

First flight tests, was planned for late June, but it will be no surprise if the company beats that schedule. Engine tests were long run last week.

The big jet transporter is expected to have a cruise speed of about 570 mph, and as commercial version to fly coast-to-coast nonstop with 30-130 passengers in less than five hours, nonstop, New York-London in less than seven hours.

In the non-traditional christening ceremony for new transporters, Mrs. William E. Boeing, wife of the company founder, awarded a bottle of champagne to the nose of the 707 after rollout at Renton, Wash., and named the craft twice "Jet Starliner" for the military model and "Jet Starliner" in the commercial version.

Family Form-Lanes of the 707 show bumps on the base, front of the B-47 Starliner, B-52 Stratofortress and the Stratofortress Powered by four Pratt & Whitney T35-L turbojet turbojets, commercial counterparts of the 707 engines in the big Boeing B-52. The



FOUR ENGINES show that all three big Boeing jets, these four pods on the 707 prototype are based on those of B-47.



CHRISTENING by Mrs. William E. Boeing, Model 707 now bears two names—Jet Starliner and Jet Starliner.

Jet Starliner again 130 ft. and is 125 ft. long. Gross weight is about 780,000 lb. (For background on 707 development, see p. 38.)

In contrast, the B-47 weighs about the same, but has a 216-ft. span, and 137 ft. length.

► B-52 "Wing-Wing" design is based on that of the B-47, with engine pods hung high and well forward and the support strut swept up over the leading edge of the wing. External control system even results in the unusual spoiler type developed for the B-52, but these appear to be outboard ailerons on the 707 wing in addition to paired spacers inboard and outboard of the mid-span inboard.

Judging by the divided fuselage near the tail, the 707 has an "all-flying" horizontal tail.

► Folding Tail-Vertical tail folds down for easy storage, but shape is that of the B-47 with characteristic wide-chord saddle and side tube.

Lack of windows in the prototype is because that plane was placed primarily as a tanker.



GRACEFUL wing plan and extended bulk of fuselage from characteristic the Boeing 707.



HEAD-ON view of the 707 shows wide lateral displacement of podded P&W engines.

# Army Sets Copter Overhaul Target

By Claude O. Witte

Future helicopters built for the U.S. Army must be capable of operating 1,000 hr between overhauls.

Col William B. Becker, Assistant Chief of Transportation for Army, told Aviation Week that the Army "will introduce into its development and procure new programs a requirement for an average maintenance interval and suspension cycles of helicopters engines and components to 1,000 hr."

Agreed on Increase—The demand followed a boundary expansion at Ft. Ligon, where Army officers and representatives of manufacturers exchanged views, moderated by Col Becker's declaration that the Army Army helicopter program is supported by high operating costs (Aviation Week May 17, p. 14).

The spokesman, conducted by the Army, found general agreement that an increase of service life to 1,000 hr will not result in a significantly increased weight, Col Becker said.

"Of course," he said, "we recognize that when you guarantee a battery for 18 months someone has to have a better idea that doesn't result in it. We also know that the degree to which we can reduce our goal is limited by our ability to our personnel problems and our operational conditions in the field."

But no cost equal and revised engine testing procedures, and as the Army and Air Force have done," he said.

## Service Tests

An adequate service test to assure 1,000 hr life for helicopter components will take a long time, but experts say that without it will show up in field deliveries of a new model.

It is estimated that each of four helicopters must accumulate at least 1,000 hr to assure the 1,000-hr overhaul period. Flying day and night over days in the week, it is possible to run up to 2,500 to 3,000 hr a year.

The procedure is not new to military. Before World War II, the Air Force flew two types of fighter planes at Wright Field on a 7 x 4-midnight schedule, and the test to help select production models and rates of modification.

**Testing Engines**—The Army's duty now is to specify 1,000-hr service life for comparable improvement over the present average of 120 to 600 hr. These are improvements of some helicopters that exceed this range, but the Army held the most current of this type.

Col Becker said he believes the necessary accepted need for "accelerated service testing" of helicopters is misleading. The emphasis, he said,

should be on "intensive service testing" because "we have had too many to get an answer in two months, and that period is inadequate."

Spokesman speakers had suggested several ways in which service testing of helicopters could be improved. Ideas ranged all the way from the Defense Department operating scheduled, around-the-clock service to a procedure of continuous operation of the craft at military bases or at the manufacturer's plant.

**Panama Plan**—There was general agreement with the thesis of Frank N. Pascolo, board chairman of Panavia Helicopter Corp., who suggested that the Army take the first step by specifying 1,000-hr service level.

Keynote of Pascolo's proposal was that longer and more efficient test periods must be provided so that a number of helicopters can be flown at least 1,000 hr to prove the dependability of parts.

In addition, Pascolo said, components must be subjected to extensive fatigue tests on test machines, a process that necessitates further equalization of time and money.

The remedy to be outlined from helicopters with 1,000-hr dependability probably is more important to the Army than any other branch of the armed forces.

Under present circumstances, the Army spokesman declared, an excessive amount of money from the maintenance budget is tied up in ground in maintenance or the supply line. An example was cited of a commonly used Army helicopter that requires more than 100,000 man-hours of maintenance.

Army plans to build another helicopter engine, said, Col Becker said.

## Court May Define 'Intrastate' Traffic

Legal question of whether there is not a clear as interstate traffic probably will be decided in a case now before the U.S. District Court at Los Angeles. It involves California Central and Pacific Southwest Airlines.

CAB's Office of Compliance claims that two carriers operate intrastate flights to serve their own passengers, despite the fact that they are not subject to out-of-state traffic. The airlines on May 17 were continuing to offer such until July when CAB filed an injunction.

**Equipment Conflicts**—Both operate between San Diego and Oakland/San Francisco, both use Civil Aeronautics Administration-licensed equipment. But because there are no laws, they are only within the state of California, CAB has never had jurisdiction over them. CAB's action only, intrastate operation.

# Europe's Air

- ICAO meeting calls for route interchanges.
- International airlines study 'red tape' cuts.

Increased coordination among nations in Europe through route interchanges and elimination of international restrictions was the principal theme of the most recent International Civil Aviation Organization meeting at Stockholm, Sweden.

Delegates also agreed on these recommendations:

- Better definition of routes through greater international cooperation between nations, with the possibility of calling an international air law convention to set out the legal problems involved.

- Expanded operation of air-ground communications by radiofrequency, to be improved by better implementation of the ICAO Air Navigation Regional Plan.

In an effort to alleviate some of the "red tape" previously concentrated in European air traffic operations, specific recommendations also were made concerning abolition of visa, exemption of baggage by airlines on departure, the possibility of dispensing with the requirements for mail return on air cargo manifests and the granting of freedom from frontier controls.

- **Open Handling**—Everything that should be done to reduce time spent on the ground during stopovers, the delegates concluded. They recommended that nations consider all technical and administrative details which take place at airports and endeavor to ensure that treatment accorded all carriers at their terminals is as free as possible that the treatment accorded to first carriers.

Other recommendations included:

- All air-traffic responsibilities should be not affecting the interests of scheduled services should be admitted fourth-provision being granted to flight for the purpose of meeting emergency or humanitarian needs, but operation for profit over those first passengers, permit charter for the entire group of the world, and all flights.
- Provisions of bilateral agreements which provide for control of capacity by reference to destinations based on stages of cargo and definition of traffic should not apply to services destined to specific countries within Europe, where should consider favorably applications for indirect routes required by air traffic.

For future development, the dele-

gates requested the council of ICAO to prepare a draft consolidated agreement for European states based on the combination of various measures for liberalization and cooperation. This agreement should not interfere with the fundamental principle of sovereignty of each state over its air space, it was emphasized.

In addition to delegates from the various European nations, representatives also attended from Argentina, Australia, Brazil, Canada, Egypt, Ethiopia, Honduras, Israel, Japan and the United States.

## Echols Dies; Collins New Northrop Chief

Northrop, Calif.—Whitney C. Collins, president of Northrop Corp., last week was named president of Northrop Aircraft, Inc., following the death May 15 of Gen. Oliver F. Echols.

Collins has been a director of Northrop since June 1955. Previously, he was Northrop's Northrop subsidiary and Collins will continue as chief executive of Gen. Echols, who joined Northrop as chairman of the board in 1958 after a distinguished service career, died of pneumonia and complications. Before joining Northrop, he served as president of Aircraft Industries Am.

**Honored**—GMC-Gen. Echols was decorated president of Northrop in 1955. His last assignment in the military was as director of the Civil Aeronautics Division of the War Department. He served as the European Theater from April 1945, as director of Military operations in Europe, before he was promoted to Supreme Headquarters. He later was deputy commanding general, Office of Military Government for Germany.

Gen. Echols was commanding general of the Air Materiel Command from March 1942, until March 1943, when he became assistant chief of staff for material, maintenance and distribution.

**Collins' Background**—Collins, long associated with aircraft manufacture, founded Republic in 1936. He was vice president and general manager of Lockheed Aircraft Corp. (1939-41), vice president and director of Electric Shipbuilding Corp. (1941-46), director of the new \$10-million investment made by American in Mexico in three private-held facilities, including the auto plant in Mexico (Aviation).

Also, AA named 140 Mexican engineers on its payroll, with only five U.S. citizens employed in Mexico.

## AA Drops Aztec Flights to Mexico

American Airlines has raised again two of its principal flight lines New York-Mexico City, Los Angeles.

It again is believed to be Army decision of traffic to Air Force's new-

port facilities for service. The Air Force had a scheduled stop at Dallas on the upland line, with stops at San Antonio and Dallas on the trip going north.

**Flight Involves**—In January, Air Force's Civil Aeronautics Board approved for operation of non-stop service to compete with Air France, but the Court of Appeals in the District of Columbia ruled in favor of Eastern Air Lines and Pan American World Airways' petitions to prohibit the service (Aviation Week Feb. 22, p. 15).

The two airlines had held that the Air Force would damage their business in the market.

American holds, however, that the Air Force would not cut the direct route behind the existing of the Air Force. Officially, the Air Force had equal service on the direct route.

**Improved AA service** to Mexico which has diverted business traffic.

**Monday**—DC-7 service to Dallas which allows a good Mexico City connection.

Mexico-bound passengers seem to prefer flying the DC-7 to Dallas, even though it has to change airplanes, American says.

But general aviation traffic in that the Air Force flight is the big story, with AA protesting domination. Not only has the Central Court of Appeals ruled against them, the Mexican government also has denied permission to American.

However, that American vice president in charge of Mexico operations has been provided to New York adds strength to this economic. Reliable sources report that the airline's Mexican operations will be handled by a local representative.

Before the entire problem lies the failure of the United States and Mexico to sign a bilateral air agreement. The U.S. reportedly is willing, but Mexico has a bilateral agreement, leaving no room for bilateral agreements to be made.

Some feel that the Mexican government's Civil Aeronautics Department is setting up a monopoly in operating the over-\$10-million investment made by American in Mexico in three private-held facilities, including the auto plant in Mexico (Aviation).

Also, AA named 140 Mexican engineers on its payroll, with only five U.S. citizens employed in Mexico.

American no longer is dealing with the Mexican government directly on its existing permit to fly. The matter now is in the hands of the U.S. State Department and CAB. If American should again gain approval in the U.S., it would be up to State Dept. to handle negotiations with Mexico.



Turbine-Powered YH-16A Nears Completion

First photo of the second Pacific Turbine power YH-16A, (previously known as the YH-16A) is working throughout of Alaska built and will be certified bench one of the turbine engine. Flight has been completed on schedule but subject of

## German Tourist Fare Hinges on Bonn Aid

For American World Airways, but, as European Airways and Air France reportedly are making agreement with the West German government concerning provision of cheaper air travel between Rheinstetten and Berlin (Aeromarine Wire May 8, p. 16).

The Bonn government wants a loan at an low rate, close to competitive with private railroad loans, between the two rates. The unions claim it would be difficult to lower private tourist loans (5.14-10 according) without some aid from the Germans themselves.

► **Reds Collect**—Major portions of the distance between Moscow and Berlin is within the Soviet Zone. To travel by rail between the two points, passengers are subjected to various restrictions and the Russian stop a sizable fee in dollar-backed West German marks from each railway ticket. Russians claim the fee goes for use of Soviet military track and their locomotives that are used to haul trains through the East Zone.

For American exports to use DC-4s leased from the Air Force. The two foreign airlines would operate their own scheduled services.

► **Coastalmove-Airlines** want the Government to finance the cost of the operation. An agreement also is being worked out. State Department sources reveal, for reduction of fuel taxes and landing fees for the airlines involved in the new operation.

Insistence of the round table  
 nation is spurring the Germans to come  
 to terms with the allies as quickly as  
 possible.

With such a rough operation, the Germans expect to maintain Russian movement of surface passenger traffic.

## Senators Cautious on Surface Mail by Air

Senate Appropriations Committee intends to keep a close rein on the Post Office Department's program of shipping third-class surface mail by air.

An opinion by the Congressional General held that shipment of surplus pork by air hinged on two factors: that there would be no greater cost involved, and that there would be no loss in the regular sea-rout export revenue.

In approving the fiscal 1955 Post Office appropriation bill, the committee

• **Delayed Post Office**, within 48 days of enactment, to make a report "which will show the full and complete cost of transporting three-cent mail by air, including clerical and ground costs, as well as the comparative cost of surface transportation between these same points." The committee also requested the Postmaster General's "observations and recommendations with respect to the extent of expense feasible in the carriage of three-cent mail by air."

- **Write a position rule** for not requiring the Post Office to submit quarterly reports on all major changes in the postal transportation field.

## ICAO Winds Up Indonesian Mission

International Civil Aviation Organization's training mission to Indonesia is now completed and several experts from Civil Aeronautics Administration have returned to their regular duty in the U.S.

The Indonesians have been taught export management, air traffic control and aviation communications to prepare them to staff their national airline Garuda Indonesia Airways. KLM Royal Dutch Airlines presently operates the country.

• **Equipment handled**—The museum also has stored ballistics in establishing surveys, installing gas environment testing system, several video cameras and control tower equipment.

George A. Crowley, chief of the industrial training group of the marina, is returning to his regular assignment at CAA's Oklahoma City, Okla., training center, as is R. B. Bridges, a communications instructor. M. F. Vandiver, chief of the marina staff, remains in Oklahoma.

## Senators Seek Faster Payment for Avgas

Legislation requiring oilmen to prepay Defense Department is curb for gasoline and other fuel supplies, "for on such basis other than actual cost as will assure prompt payment" has been approved by Senate Armed Services Committee.

"The purpose . . . is to provide further evidence whereby suppliers, especially foreign producers, have been treated without accurate accounting methods for assessing payment to the government at the cost of such supplies," the committee explained (*American Worker*, Apr. 5, p. 18; May 18, p. 7).

### AF Contract to BOAC

(McGraw-Hill World News)

Glasgow, Wale-U. S. Air Force has awarded British Overseas Airways Corp. a \$2.25-million contract for overhaul of all engines of USAF Douglas G-41s in Europe, according to a BOAC spokesman.

The USAF contract is expected to keep BOWC's overhead shops heavily employed for the next three months and will help ease the shortage of work experienced here recently which led to loss of 120 workers.

The contract is expected to keep the 113 employees at the plant busy but not turn in requiring re-employment of those laid off.

**Convair**...first choice all over the world!

Thirty airlines have chosen CONVAIR fleets for your air travel comfort and speed. Ask your favorite airline or travel agent to make your next flight a Convair... world's most popular passenger plane.



ALL RIGHTS RESERVED

Most airlines have chosen Conquest from any other modern passenger plane, and as a transport-carrier for the U.S. Air Force, the Conquest is making new records for versatility and performance — another evidence of Conquest's **ENGINEERING TO THE MAX POWER**.



© 2000 Blackwell Science Ltd, *Journal of Internal Medicine* 247: 391–397

## CONVAIR



### Scorpion Rocket Pod Is Muzzle Loaded

This is the first view of 2.75-in. solid-rocket motors being loaded into the stationary rocket pad at a Northrop F-10D Scorpion aircraft at Schriber, E. C. Field, N.Y.

Group Eight server technician, shows the laptop monitor into place using a loading tool. The two-piece Scorpion carries 104 sockets, some and fans three electronically.

# OMOHUNDRO MEANS AIRCRAFT STANDARDS OF INSPECTION



Wall thickness and height must check within .002 inch.

AS FAR as human skill and experience and the resources of science can prevent, no foreign part produced by Omohundro is delivered with any detectable flaw. In an industry where the failure or imperfection of any component can have far-reaching or even fatal consequences, the vigilance of our carefully staffed and well-equipped inspection department is a source of strength and satisfaction.

For specific information contact Paul Omohundro Company, Box 684, Portsmouth, Calif. Phone: TOrrey 8-7001.



For each part, fully inspection—90% to 99%—guarantee is 98%.

FIREGLASS PARTS DIVISION

# OMOHUNDRO

Southern Representative, C. P. Wagoner Co.,

Box 1387, Grand Prairie, Texas

## Status of Funds for Airpower

This table shows monthly obligations and expenditures for Air Force and Navy aircraft and related procurement over the beginning of fiscal 1954 (or July 1) to the end of the fiscal year, showing obligations and expenditures from July 1950 through September 1953 appeared in Aviation Week Nov. 9, 1953 (p. 17).

		Obligations in millions									
		1957				1958				TOTAL	
FY 1954	Month	Actual	Estimate	Diff.	Monthly	Actual	Estimate	Diff.	Monthly	Actual	Estimate
July	1950	\$10	\$10	\$0	\$10	\$10	\$10	\$0	\$10	\$10	\$10
Aug.	1950	10	10	0	10	10	10	0	10	20	20
Sept.	1950	10	10	0	10	10	10	0	10	30	30
Oct.	1950	10	10	0	10	10	10	0	10	40	40
Nov.	1950	10	10	0	10	10	10	0	10	50	50
Dec.	1950	10	10	0	10	10	10	0	10	60	60
Jan.	1951	10	10	0	10	10	10	0	10	70	70
Feb.	1951	10	10	0	10	10	10	0	10	80	80
Mar.	1951	10	10	0	10	10	10	0	10	90	90
Apr.	1951	10	10	0	10	10	10	0	10	100	100
May	1951	10	10	0	10	10	10	0	10	110	110
4 months to be made											
FY 1954	Month	Actual	Estimate	Diff.	Monthly	Actual	Estimate	Diff.	Monthly	Actual	Estimate
July	1950	\$10	\$10	\$0	\$10	\$10	\$10	\$0	\$10	\$10	\$10
Aug.	1950	10	10	0	10	10	10	0	10	20	20
Sept.	1950	10	10	0	10	10	10	0	10	30	30
Oct.	1950	10	10	0	10	10	10	0	10	40	40
Nov.	1950	10	10	0	10	10	10	0	10	50	50
Dec.	1950	10	10	0	10	10	10	0	10	60	60
Jan.	1951	10	10	0	10	10	10	0	10	70	70
Feb.	1951	10	10	0	10	10	10	0	10	80	80
Mar.	1951	10	10	0	10	10	10	0	10	90	90
Apr.	1951	10	10	0	10	10	10	0	10	100	100
May	1951	10	10	0	10	10	10	0	10	110	110
June	1951	10	10	0	10	10	10	0	10	120	120
July	1951	10	10	0	10	10	10	0	10	130	130
Aug.	1951	10	10	0	10	10	10	0	10	140	140
Sept.	1951	10	10	0	10	10	10	0	10	150	150
Oct.	1951	10	10	0	10	10	10	0	10	160	160
Nov.	1951	10	10	0	10	10	10	0	10	170	170
Dec.	1951	10	10	0	10	10	10	0	10	180	180
Jan.	1952	10	10	0	10	10	10	0	10	190	190
Feb.	1952	10	10	0	10	10	10	0	10	200	200
Mar.	1952	10	10	0	10	10	10	0	10	210	210
Apr.	1952	10	10	0	10	10	10	0	10	220	220
May	1952	10	10	0	10	10	10	0	10	230	230
June	1952	10	10	0	10	10	10	0	10	240	240
July	1952	10	10	0	10	10	10	0	10	250	250
Aug.	1952	10	10	0	10	10	10	0	10	260	260
Sept.	1952	10	10	0	10	10	10	0	10	270	270
Oct.	1952	10	10	0	10	10	10	0	10	280	280
Nov.	1952	10	10	0	10	10	10	0	10	290	290
Dec.	1952	10	10	0	10	10	10	0	10	300	300
Jan.	1953	10	10	0	10	10	10	0	10	310	310
Feb.	1953	10	10	0	10	10	10	0	10	320	320
Mar.	1953	10	10	0	10	10	10	0	10	330	330
Apr.	1953	10	10	0	10	10	10	0	10	340	340
May	1953	10	10	0	10	10	10	0	10	350	350
June	1953	10	10	0	10	10	10	0	10	360	360
July	1953	10	10	0	10	10	10	0	10	370	370
Aug.	1953	10	10	0	10	10	10	0	10	380	380
Sept.	1953	10	10	0	10	10	10	0	10	390	390
Oct.	1953	10	10	0	10	10	10	0	10	400	400
Nov.	1953	10	10	0	10	10	10	0	10	410	410
Dec.	1953	10	10	0	10	10	10	0	10	420	420
Jan.	1954	10	10	0	10	10	10	0	10	430	430
Feb.	1954	10	10	0	10	10	10	0	10	440	440
Mar.	1954	10	10	0	10	10	10	0	10	450	450
Apr.	1954	10	10	0	10	10	10	0	10	460	460
May	1954	10	10	0	10	10	10	0	10	470	470
June	1954	10	10	0	10	10	10	0	10	480	480
July	1954	10	10	0	10	10	10	0	10	490	490
Aug.	1954	10	10	0	10	10	10	0	10	500	500
Sept.	1954	10	10	0	10	10	10	0	10	510	510
Oct.	1954	10	10	0	10	10	10	0	10	520	520
Nov.	1954	10	10	0	10	10	10	0	10	530	530
Dec.	1954	10	10	0	10	10	10	0	10	540	540
Jan.	1955	10	10	0	10	10	10	0	10	550	550
Feb.	1955	10	10	0	10	10	10	0	10	560	560
Mar.	1955	10	10	0	10	10	10	0	10	570	570
Apr.	1955	10	10	0	10	10	10	0	10	580	580
May	1955	10	10	0	10	10	10	0	10	590	590
June	1955	10	10	0	10	10	10	0	10	600	600
July	1955	10	10	0	10	10	10	0	10	610	610
Aug.	1955	10	10	0	10	10	10	0	10	620	620
Sept.	1955	10	10	0	10	10	10	0	10	630	630
Oct.	1955	10	10	0	10	10	10	0	10	640	640
Nov.	1955	10	10	0	10	10	10	0	10	650	650
Dec.	1955	10	10	0	10	10	10	0	10	660	660
Jan.	1956	10	10	0	10	10	10	0	10	670	670
Feb.	1956	10	10	0	10	10	10	0	10	680	680
Mar.	1956	10	10	0	10	10	10	0	10	690	690
Apr.	1956	10	10	0	10	10	10	0	10	700	700
May	1956	10	10	0	10	10	10	0	10	710	710
June	1956	10	10	0	10	10	10	0	10	720	720
July	1956	10	10	0	10	10	10	0	10	730	730
Aug.	1956	10	10	0	10	10	10	0	10	740	740
Sept.	1956	10	10	0	10	10	10	0	10	750	750
Oct.	1956	10	10	0	10	10	10	0	10	760	760
Nov.	1956	10	10	0	10	10	10	0	10	770	770
Dec.	1956	10	10	0	10	10	10	0	10	780	780
Jan.	1957	10	10	0	10	10	10	0	10	790	790
Feb.	1957	10	10	0	10	10	10	0	10	800	800
Mar.	1957	10	10	0	10	10	10	0	10	810	810
Apr.	1957	10	10	0	10	10	10	0	10	820	820
May	1957	10	10	0	10	10	10	0	10	830	830
June	1957	10	10	0	10	10	10	0	10	840	840
July	1957	10	10	0	10	10	10	0	10	850	850
Aug.	1957	10	10	0	10	10	10	0	10	860	860
Sept.	1957	10	10	0	10	10	10	0	10	870	870
Oct.	1957	10	10	0	10	10	10	0	10	880	880
Nov.	1957	10	10	0	10	10	10	0	10	890	890
Dec.	1957	10	10	0	10	10	10	0	10	900	900
Jan.	1958	10	10	0	10	10	10	0	10	910	910
Feb.	1958	10	10	0	10	10	10	0	10	920	920
Mar.	1958	10	10	0	10	10	10	0	10	930	930
Apr.	1958	10	10	0	10	10	10	0	10	940	940
May	1958	10	10	0	10	10	10	0	10	950	950
June	1958	10	10	0	10	10	10	0	10	960	960
July	1958	10	10	0	10	10	10	0	10	970	970
Aug.	1958	10	10	0	10	10	10	0	10	980	980
Sept.	1958	10	10	0	10	10	10	0	10	990	990
Oct.	1958	10	10	0	10	10	10	0	10	1000	1000
Nov.	1958	10	10	0	10	10	10	0	10		

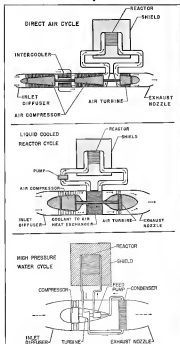




# AERONAUTICAL ENGINEERING

NACA Research Engineers Tackle the Problems of . . .

## Heat: The Key to A-Powered Aircraft



The most important single factor in the development of nuclear-powered aircraft is the operating temperature of the thermodynamic cycle.

That single parameter determines whether or not the airplane will fly at all, and what it will weigh. And if the airplane will fly at all, its range will be twice then adequate.

These are the questions faced by calculations and some tests of Alex Schemm, assistant director of the NACA's Lewis Flight Propulsion Laboratory, Cleveland.

**Heat Difficulties:** The higher the operating temperature, the lighter the final airplane is going to be, and the more economical will be the complete program. But Schemm says the most difficult scientific and engineering problems encountered in the nuclear program are the result of the quest for higher operating temperatures.

For this reason, the Lewis Laboratory is deep in research on metals and heat transfer techniques for nuclear powerplants.

In material selection, there is a different trade-off. There are some of the high stresses of rotating machinery as in the turbine. But there are these requirements for materials:

- Secondary physical properties at high temperatures
- Low coefficient of expansion for non-thermal. This property affects the ability of the material to "capture" stresses from the reactor and then slow down the rate of expansion.
- Compatibility between material and coolant to avoid corrosion and mass transfer.
- Ability to avoid thermal shock from rapid changes in temperature.

Relieve uncertainty in change in properties as a result of nuclear radiation.

**Heat Transfer:** The Lewis Laboratory is investigating mass transfer because of its extreme importance in the cooling cycle. Liquid metals and sodium salts, two classes of suggested heat transfer mediums for nuclear powerplants, show varying degrees of mass transfer.

Two things happen. First, the products of the chemical reaction between coolant and structure pile up on the

**POWERPLANT** design (top to bottom): Reactor system turbine's combustion chamber; liquid coolant improves heat transfer; gas more pure; superheated water feeds into steam to drive turbine.

## NACA Apparatus for Nuclear-Reactor Research



COOLANT CORROSION, more trouble are studied here.



CLOUD CHAMBER helps study nuclear collisions.



HEAT TRANSFER conditions from metal to high-pressure water are contained in this apparatus. Right photo shows test section.



VAPOR PRESSURES of high tests are determined here.



APPARATUS tests sodium salt heat transfer characteristics.



**IMPORTANCE OF TEMPERATURE** of the ejecting code is pointed up in these two charts of relative weight of the complete airplane. For example, assume a 50,000-lb. design airplane, then an airplane using a 2,000-psi temperature would weigh about 75% of the airplane produced with the 1,000-psi code. In the second chart, notice that relative weight increases tremendously with relative for a constant Mach number. Selection points out that to get reasonable weights for the airplane it would probably be desirable to go to even higher temperatures than the 2,000-psi code in this case.

► **Reduction Damage**—In a nuclear reactor, there are going to be collisions between heavy charged particles and the atoms of the coolant material. These repeated collisions structural stress from their normal position and may cause changes in physical and mechanical properties. But the collisions are frequent only when the particles are moving relatively slowly.

The researcher puts a break here, col- lisions are shown the same as gases in a nuclear and so gas can be used as the medium under investigation. The advantage is that the path length of charged particles is estimated many times in a gas, and that the paths can be made visible with standard cloud chamber techniques.

Leveson scientists have been using a natural radioactive source to supply particles through a cyclotron to be the cloud chamber. Low-energy alpha particles are being studied by measuring the length of tracks and the extent to which they deviate from a straight line. The length indicates the energy loss rate of the particle; the deviation, since it was the extent to which collisions occur.

► **High Temperature**—Some of the materials suggested for use in reactor structure are relatively new, and no thermodynamic data have been obtained. One test apparatus at Leveson is used to determine the vapor pressure at high temperatures, from which some of the thermodynamic constants can be computed.

Researcher will have a power limitation in the amount of heat that can be removed during operation. Liquid metals are among the best mediums for heat transfer, but their convective heat transfer properties cannot be predicted from the fluidity rules.

An experimental apparatus is being used to determine the heat transfer characteristics of a liquid-metal surface. That particular combination has a low melting point, a low convective coefficient and low thermodynamic stability.

NACA tests have shown that heat transfer coefficients determined experimentally are about 60 to 70% of the values predicted by theory, other tests have shown a range from 10 to 100% of theory. This extreme spread is an explanation of the moment, and precise values of liquid-metal heat transfer coefficients are still in doubt.

Water, the traditional coolant, has possible applications in the nuclear field because of its moderating properties and because it can be made non-corrosive. But the temperatures encountered require the water to be under high pressure, a region where very little heat transfer information is available.

Then another test apparatus was born. Technicians are examining the

cooling passages around the coolant ducts in order to find the hot spots of the cooler walls and deposit it in colder locations.

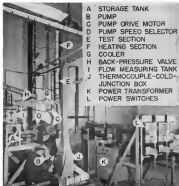
The structure is weakened, and may be plugged by this same transfer.

- Leveson investigation is in three phases:
- Determination of the mechanism of mass transfer.
- Determination of the relative weakness of systems under static conditions.

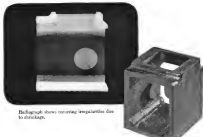
► **Flow tests of the most promising systems**

Test apparatus for this study has independent variation of fluid viscosity and temperature gradient. The system contains no other metal except that under study, and requires no pump, valves or flowmeters.

One thing known: Static studies may be misleading for studies of dynamic systems.

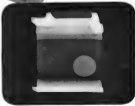


**NACA USES** this apparatus to study heat transfer characteristics of liquid-metal.



Radiograph shows recurring irregularities due to shrinkage.

## RADIOGRAPHY puts the finger on a profit thief



A change in getting product sound cooling

Shrink was a problem in casting this instrument housing of 305 aluminum. It looked like the yield would run low.

But radiographs of pilot runs put the finger on the cause—revealed a pattern of recurring irregularities. This suggested a change in gating which, when adopted, quickly converted the difficulty.

Cases like this show why more and more foundries make radiography a routine practice. It prevents their work around—helps build a reputation for consistently good castings.

Wouldn't you like to know how Radiography can work for you? Get in touch with your x-ray dealer. Or, write us for a free copy of "Radiography as a Foundry Tool."

**EASTMAN KODAK COMPANY**  
X-ray Division, Rochester 4, N. Y.

**Radiography...**  
another important function of photography

**Kodak**  
MADE IN U.S.A.



TOMORROW'S AIRCRAFT. *One step closer*

**NOW...an a-c motor that  
runs "cool," retains output  
at extreme altitudes**

Drive power you can depend on... that's the keynote of the new line of Westinghouse 400-cycle, a-c motors. They deliver from 1/30 hp to 3 hp continuously from sea level to 50,000 feet—and raise performance standards to new highs in reliability and efficiency.

More horsepower than ever before has been packed into extremely small dimensions—like the four-inch diameter frame which delivers 3 hp and weighs under 80 lb. In spite of this small size and high rpm, temperature rise is kept exceptionally low by using new cooling techniques giving optimum thermal characteristics to produce the greatest possible horsepower per pound at all altitudes.

These new motors, designed to meet the requirements of specification MIL-M-1965, are totally enclosed, fan cooled and explosion-proof—ready-made for the most hazardous airborne applications. Sprayed flame is used by a shrouded flame arrestor mounted outside the motor. A patented method of flame suppression provides this great advantage on larger, open motors, over 3 hp.

#### Get More Information . . . NOW!

These new a-c motors—in ratings from 1/30 to 3 hp—are available NOW for direct drive and gear head applications. A drive you can depend on for test controls and actuators, they meet better and our specifications with reserve to spare.

And Westinghouse will render full assistance in applying this new motor—the most advanced 400-cycle, a-c drive available today—to help you bring tomorrow's aircraft... One Step Closer. Get complete data and application information from your Westinghouse salesman or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 600, Pittsburgh 30, Pennsylvania.

4000



The exclusive Westinghouse cooling design is built around an aluminum frame with integral fins. A new, efficient shrouded fan provides high volume cooling air flow. This motor has extended condenser life, gives more efficient internal air circulation and cooling without added fan weight.

Performance over the 1-hp motor highlights the efficiency of these new a-c motors and their ability to handle loads from sea level to 50,000 feet. Greatly simplified and ruggedly designed, they handle even higher voltages loads for emergency demands, especially at altitude.

Jet Propulsion • Airborne Electronics • Aircraft Electrical Systems and Motors • Wind Tunnels to Fleets

YOU CAN BE SURE...IF IT'S

**Westinghouse**



# Buckets by MISCO

## for Curtiss-Wright Turbo Compounds



This intricate bucket is an integral part of the power recovery units in the powerful Curtiss-Wright Turbo-Compound Engine (shown above) which is now rated at 3700 h.p. for the U. S. Military Services and has been selected by 22 of the World's Leading Airlines for high-speed, long range transports.

Production of this complicated component clearly constitutes a notable MISCO achievement in practical engineering, metallurgical knowhow, and highly skilled techniques to meet the most exacting requirements.

**For Castings of Greater Dependability, Better Performance and Longer Service Life, Specify**

**MISCO**

PRODUCED BY MISCO, AN AFFILIATE OF THE GENERAL CORP.

*Misco Precision Casting Company*  
DIVISION OF FORD-MERIDIAN CORPORATION

**DETROIT DIVISION**  
153 St. Aubin Avenue  
Detroit 7, MICHIGAN  
Phone 7-1545

**WHEELHALL DIVISION**  
116 West Gibbs Street  
Wheelhall, MICHIGAN  
WHitehall 3-1515



**HEAT TRANSFER** through various fluids

heat transfer coefficients between metal and high-pressure water at temperatures up to 1,000° and pressures up to 5,000 psi.

Mercury sodium hydroxide is another substance under consideration for a heat transfer medium. NACA tests of a hydroxide-to-oil heat exchanger have produced some fundamental data.

Heat Exchangers-2 has never been out to design a heat exchanger for use, and the metal-covered plate will demand even more efficient units.

The exchangers must be light, of small volume, and have a high heat transfer per unit of volume, low air pressure drop, high operating temperature and, says Silverstein, "several other characteristics not found in currently available heat exchangers."

Two types are under consideration: shell and tube, with the liquid metal in the shell fluid, and finned tube, with the liquid metal in the tube fluid, both of the conduction type.

Liquid metal shell advantages over other heat transfer mediums when high heat transfer coefficients are required and where high temperatures must be used. But they may possibly cost more, and are certainly harder to handle.

Given in general, Silverstein says, are not compatible with liquid metal and neither are engine components. The principal competitor is water, but its application is limited by high pressure.

Two engine men were independently alerted by Silverstein in his personal time. Shaking and rattle involve Wright of the powerplant will be determined more by the weight of the shaking than by any other factor, he said, and added that much engine need development work remains to be done in the field of engine analysis.

This article is based on "Some Aspects of Research on Nuclear Power for Aircraft," a paper presented to the New York Chapter of the Institute of the Aeronautical Sciences in A. Silverstein, associate director of NACA's Lewis Flight Propulsion Lab.

## Whatever the job...

marking  
lines



PERMACEL J2  
COLORED PLASTIC TAPE

or  
airlines



PERMACEL J2 MARKING TAPE

# PERMACEL TAPES

Find out how you can use self-sticking tape

write Permacel Tape Corporation, New Brunswick, N.J.



**MODEL 307-02**  
Boeing Transport Prototype  
Built in 1946



**MODEL 307-01**  
Boeing Transport Prototype  
Built in 1946



**PROTOTYPE**  
Boeing Transport Prototype  
Built in 1946



STRATOLINER EVOLUTION began in 1946, covered more than 150 studies. Then came C-97 influence on the design

## Stratoliner Shows Its Pedigree

Boeing Airplane Co.'s new 707 Stratoliner jet transport is the culmination of a learning curve that started when the company initiated design studies in 1946. It covered more than 150 jet and turboprop "paper airplanes" before reaching the present configuration.

During the process of evolution, the 707 design carried "blood lines" of two ancestors: the B-47 and B-51 jet bombers and the KC-97 and Stratoliner transports. The design shows how characteristics of these planes were amalgamated and finally emerged in greatly modified form in the prototype Stratoliner.

■ **Basic shell**—In 1950, a significant design, the 473-60, one of a series of "707" models, was as far as a wind-tunnel study. Seating 60 passengers, the project was laid out in two versions, a 115,000-lb. domestic version type and one weighing 188,000 lb. for overseas routes.

Sketches along the process, Boeing engineers grew solid on the project. Details centered around the landing gear arrangement, a brace

unit with all three legs supported in the fuselage. This layout accumulated a severe load with the wheels placed unusually far to the rear.

Even while the 473-60 study was in the works, the company was conducting work of getting out a high-speed transport study and passed to modifying the C-97 configuration. On the drawing boards, the Stratoliner was converted to turboprop and then jet power. In the 507-60 turboprop model the modification called for tail wings (first three views, above). The date 1950.

■ **Adjust philosophy**—In the interim, U. S. military air power was going to send object states. This called for an all jet tanker, Boeing felt. Late in 1950, the 507-60 (lower sketch) evolved, having a C-97 fuselage, four jet engines installed in two twin pods, and midway-folding landing gear.

Considerable time was spent on the 507-64 proposal with six different wing configurations being tested. The resulting version had 2,500 sq ft of wing and 37.5-deg. sweepback. Wind-tunnel tests were carried out

The big drawback was fuel capacity. In continuously modifying the design's wing down, a bad loss, stretch, threat to achieve desired Mach number performance, resulting fuel loss. In addition, the thrusting unit resulted in a wing that would be difficult to manufacture compared to the B-51 wing.

To meet these objectives a new, thicker wing was planned with greater sweep (35 deg.). In planform the wing resembled the 507-64 wing (revised an additional 30 deg. at the root. Span was 130 ft; instead of the previous version's 148 ft; and the 2,500 sq ft area was maintained). This is beneath the wing, with some refinements, on the 707 Stratoliner prototype.

Late in 1951, the lesson learned from its drawing board lapses and experience gained from 49 "test beds" types had given Boeing a large pool of valuable data. The time was ripe for launching "Project X," the 707 Stratoliner, the translation of information into metal (see *Aerospace Week* Mar. 8, p. 14).



One out of five is a full time inspector

... to keep **TIMKEN®** stainless steel forging bars uniform

ONE out of every five of the people who make Timken® stainless steel forging bars is a full time inspector. These men check every order for everything from the chemical composition of the metal to grain size after heat treatment. In fact, they make 40 chemical checks alone of every bar of steel that goes into Timken stainless steel forging bars.

This is one reason why Timken stainless steel forging bars have no variation within any order—have no variation from order to order. They have uniform physical properties, uniform uniformity in heat treatment, have uniform grain size after heat treatment and have good dimensional tolerances.

You'll find that Timken stainless steel forging bars hold your copies in a minimum, require fewer tolerance adjustments and have uniformly high ductility and resistance to impact.

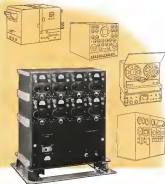
Our technical staff will help you choose the correct analysis of Timken stainless steel forging bars for your requirements. And our production department will make sure you get your order on time. For more information, write for your free copies of our technical bulletins on stainless forging steel. Address: The Timken Roller Bearing Company, Steel and Tube Division, Canton, 6, Ohio. Cable address: "TIMKOR".

TECHNICAL—EXPERIENCE AND SKILL



**TIMKEN**  
Fine Alloy  
**STEEL**

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



## Optimum System Accuracy

WITH W.M. MILLER AMPLIFIERS

The most critical element in an index measurement or control system, the amplification determines control precision. Input from transducers or other signal sources may be accurately output devices may provide exact indication. But if intermediate circuitous measurements, overall values are greatly affected. W.M. Miller Instruments offers these basic amplifier types for incorporation in a wide variety of instrumentation systems. Each represents the most advanced, thoroughly tested design in its field, each allows the engineer to retain full advantage of the inherent accuracy of other system elements.

**CARRIER-TYPE SYSTEMS** are available at extremely low to medium (500 cps) frequencies and stable in short-range work.

**D-C AMPLIFIERS** combine high gain, wide-band response, low drift, are used for the precision laboratory measurement.

**LINEAR-INTEGRATING SYSTEMS** are highly useful in vibration studies, provide direct measurement of velocity and displacement.

A brochure describing Miller Amplifiers will be mailed on request.

**W.M. MILLER INSTRUMENTS, INC.**  
CUSTOM INSTRUMENT DESIGNERS AND MANUFACTURERS  
325 N. HALSTED AVENUE • PALM BEACH, CALIF. • RTAR 5-8217

## THRUST & DRAG

"... a Moby Dick balloon... was launched from Vernalis, Calif., and rose... to a peak altitude of 17,000 ft. Tracked continuously, it was eventually recovered in Spain after some 52 hours and 6,350 miles of flight... We can guarantee the flight at any given time and, within a reasonable degree of accuracy, can select our report point."

So said Brig. Gen. Floyd R. Wood, Deputy Commander for Technical Operations in the Air Research and Development Command, to the American Meteorological Society last month.

Now there, back to the Imperial secondary balloons of World War II which landed along the West Coast and did some damage. Then there ahead to a high-altitude balloon carrying a small Avionics. It is to be put down with a reasonable degree of accuracy. It can't be tracked crash on radar, unless you want it to be, and of course in this case, you wouldn't. It will along at high altitudes, and maybe there are a few secret reports, but on other occasions. Each working radar station.

After some time, the balloon signal is gone, and the bomb is dropped.

Offhand, this seems like one of the nation's most advanced perspective missile systems that could be dropped up. Anybody want the idea?

He loved to fly and to talk about flying. The drag was spectacular, like his sport pilots and the light blue flying suit he wore. He could just squeeze his shoulders between the cockpit ribs of the Mustang with his personal number—the Indian head of the Lafayette Escadrille—pinned on its nose.

He ate with the visible enjoyment of the Frenchmen of his adopted country, and once at lunch, he explained to me—though his English was slow and my French much worse—the subtle taste differences of the various shellfish on the hors d'oeuvre tray.

He fought through the second war for France, to the air at the head of the Escadrille. After the war and a few years, he joined Dornier.

A few weeks ago, he was making a low-level high-speed pass in a Mustang. A sudden, sharp drop lower than he did—when a vapour jet lifted the wing into the ground.

So, Col. Constantin Ruzavski, one of the world's great test pilots, died doing the one thing in the world he loved best to do.

—DRA

# Eclipse-Pioneer Polar Path marks a new high in navigation efficiency

*New, lightweight compass system provides  
super-accurate navigation anywhere in the world*

Here is a compass system as accurate, as compact, as flexible, and so broad in application that it may be used as a directional reference on any type operational aircraft anywhere in the world.

The Eclipse-Pioneer Polar Path is a gyro-compass system that utilizes the most type high-accuracy gyro which is successfully blended the end during 1936 in co-ordinate-Pole gyro navigation. Polar Path can be used solely for directional reference, if desired. Or it can be used to provide directional control for an auto pilot, a hand director, automatic approach system or other devices requiring super-accurate directional reference in any latitude.

Among the many important advantages of Eclipse-Pioneer Polar Path are the following:

- It meets, or better, the performance and weight requirements of the latest applicable military specifications for compass systems.
- It combines the delicate accuracy of a proved gyro navigation system with the long-term reference reliability of a new Flux Gate® compass weighing less than one pound.

ability of a new Flux Gate® compass weighing less than one pound.

- It is designed for all operational types of aircraft from carrier-based fighters to multi-engine aircraft, including bombers and commercial transports.
- The controller, with its directional reference switch, latitude correction scale, and synchronizing and course setting controls, is compact... designed for convenient console mounting and ease of operation.
- The Flux Gate system is always available for standby compass when desired.

As an Eclipse-Pioneer development, Polar Path is engineered and manufactured by the world's largest producer of precision gyroes for aircraft use. Gyrois of the super-accuracy type used in Polar Path have for some time been manufactured by Eclipse-Pioneer. And it is super-accuracy... plus great flexibility... that mark Polar Path as the modern compass navigation system. For full details, write us today.

NAVIGATION THAT HAS BEEN PROVEN ANYWHERE





**CHANGE BOARD MEETS** at Republic Aviation Corp. to discuss proposed modifications of F-34C and B-24C wing skin design.

## SAE Production Panel Discusses . . .

# What to Do About Engineering Changes

There is many a piece of equipment or part slated for use in the aviation industry that has an engineering change waiting for it somewhere along the production line.

Why? Because it is normal practice—a modification necessary for cost reason or reaction to long years with changing conditions in the field.

The change may be made to meet lower competitive costs or to improve quality. It may be made at a design refinement to keep up with new and more existing applications. Whatever the reason, engineering changes frequently bring headaches for the designers, production men, sales and service personnel.

A general discussion of problems associated with engineering changes, lead time, and their effect on costs was at the spotlight at the recent production forum of the Society of Automotive Engineers' National Association Meeting at New York, where the subject was analyzed by industry experts competing

as audience-panel group.\* The following article is based on the group's discussions.

## Change Types

• **INTO WHAT** basic categories do engineering changes fall?

There are three basic types: negotiable, convenience of production, and mandatory.

Negotiable type is where the customer is dependent upon the time in which the change is to be phased in.

Convenience-of-production type is in the nature of a refinement revision which can be put in at the completion of existing stock.

Mandatory type involves changes where parts do not fit, but must be corrected, where tolerances do not allow production of the parts where safety of flight is involved, or if the change is not made, a functional breakdown of the part results, where the wing service or customer finds the part unsatisfactory, where the quality of the product must be maintained.

In most organizations, mandatory changes usually comprise 10 to 15% of all changes made.

## Board Action

• **WHAT IS** the usual makeup of a change board or control group?

It usually consists of members from engineering, sales, service, manufacturing, production or planning, and procurement departments.

• **HOW DOES** a change board determine to know that changes are put into production?

Most change boards use some system of identifying changes by order number or other means to make sure that the information is coded to the engineering being planned. Flow charts are usually used for engineering, tooling, material, production, processing, manufacturing and final installation. This information is disseminated to the various departments and followed up. Each company usually follows its follow-up stage to suit its own operations.

One suggestion to improve follow-up is the use of checklists describing the parts new as particular to the change. The checklist is keyed to the change board number appearing on all engineering and other documents. This checklist is a very useful tool for Production Control to follow, expediting the part to completion.

• **FROM SHOULD** A CHANGE be brought to the attention of the change board?

The procedure varies. Generally the representative of the department most interested in the change will bring it to the board for action. For example, a change in the specification of the



## Martin Aircraft Forms Solid Ingots of Scrap Sheet Titanium with Sciaky Spot Welder

The Manufacturing Research and Development Unit of the Glenn L. Martin Company has developed a technique to utilize virtually all their scrap sheet titanium. A six inch pile of 10 bars of scrap of 001 titanium with two incrustations at each end of 001 titanium is joined with one weld on a Sciaky type PMCO 627 600 KVA Three-Phase Root Welder.

The weld nugget forms a solid ingot of virgin metal at least as strong as the parent metal. This ingot can be machined into a variety of titanium parts. An expensive waste is almost entirely eliminated, and the months of lead time required for delivery of titanium for machining is avoided.

Martin Research offers another fine example of Sciaky basic finishing as design with resistance welding equipment to do more useful work at the lowest operating cost with maximum reliability.



*Closest Manufacturer of Stable Resistance Welding Machines in the World*

**SCI AKY**

4925 West 47th Street, Chicago 24, Illinois

## SIMPLE EQUATION:

**Pesco**  
PRESSURE-LOADED  
PUMPS =

**DEPENDABLE  
PERFORMANCE**



Engineers recognize the for design and operation of all types of aircraft never compromise on dependability. By this same logic, they rely on the experience and ability of Pesco for fuel and hydraulic pumps that will insure peak performance. They know this line experience that the dependability of Pesco products results from several factors—all of them important to aircraft design and operation.

First, there is Pesco experience. Since 1919 Pesco has developed its full facilities on the continuous development of aircraft pumps, motors, and accessory equipment. The successful solution of thousands of pumping problems has provided Pesco with unmatched "know-how" in pump design, characteristics, and application.

Then there are Pesco engineering and research—continuous and complete services using advanced technology in both design and materials to provide improved products and solutions to pumping problems.

And finally there are Pesco production facilities—designed to produce precision units in volume. High-precision machines and advanced production and testing techniques are reflected in the consistently high quality of all Pesco products.

Then since Pesco admissions can be used to solve your specific pumping problems successfully. Simply call or write the Home Office, Bedford, Ohio.

Pesco Model No. 111530 Electric Motor-Driven Hydraulic Pump with C 516 cyclic lock  
Development 1.3 gpm @ 3000 psi, 24 Volt  
Weight 28 lbs.

### YOU CAN RELY ON **PESCO** *Precision* **PUMPS** FOR THESE ADVANTAGES

DEPENDABLE PERFORMANCE  
AUTOMATIC ADJUSTMENT FOR NEAR  
LESS MAINTENANCE

Call or write the Home Office, Bedford, Ohio  
for full information on these Pesco products as  
applied to your specific installation.

HYDRAULIC PUMPS	FUEL PUMPS
AIR PUMPS	POWER PACKAGES
ELECTRIC ACTUATORS	BOOSTER PUMPS



**BORG-WARNER CORPORATION**  
24700 NORTH HILL ROAD BEDFORD, OHIO

product should originate through Engineering. One which affects the customer would be brought up by Sales or Service. A change which will help production or manufacturing would originate in manufacturing.

### Fast Handling

•HOW IS PRIORITY established on change?

Chicago based in most companies establish the priority, which depends on the importance of the change or its classification. The board can perform a very valuable function in sorting out the priority from the secondary type of requests, establishing a good working priority list.

•WHAT IMPROVEMENTS can be made to our own can become handling of a rush change for a board?

Our approach is to set up a special committee on the board, consisting of engineering, sales and manufacturing representatives, who could quickly advise advanced changes that are deemed urgent, in order to get the change into work rooms. This special committee would act between regular change board meetings, and have necessary responsibility.

### Flow Time

•HOW LONG should it take to produce a change and peak an effective point where it is introduced into the production line?

There is no fixed answer to this question. Time varies approximately one month in most companies. If conditions warrant and the change is relatively a "low cost" method could be devised to speed up the normal flow time.

•SHOULD CHANGE DATA be released as a package or as detail as it becomes available?

In most cases it is better to get the information in detail and put it through progressively. However, there are certain instances where the package method might be necessary for installation, as in the case of accessory supplies, for which the method might work better. Some systems and engine manufacturers hold that release by detail requires the effective point.

•WHAT CAN BE DONE to insure that a change can be incorporated in time?

This is a problem in most companies, and there is no one method known which can guarantee performance. A good follow up of the test and development progress usually can help. Engineering to get its answers, so that it can design and release final drawings sooner.

•HOW CAN WE DETERMINE

# FLIGHT PROVEN!



EMERGENCY POWER  
TURBINE



ENGINE POWER  
CONTROL



AUXILIARY POWER  
TURBINE



FUEL INJECTORS



FUEL PUMP  
TURBINE



VARIABLE JET  
ENGINE NOZZLES

These accessories are currently in production.  
Classified engineering research are available.

**marquardt** AIRCRAFT CO.  
Van Nuys, California

THE WORLD'S LARGEST JET ENGINE RESEARCH AND DEVELOPMENT CENTER



**WING SPARS** are stacked to be ready for 1-144 and 83-144 protection change.

when we have reached too many changes?

Clearly, good scheduling, follow-up and budget control can give warning signs to Management. It is necessary that controls be established, because a company cannot wait until it reaches schedules to find out that it has exceeded too many changes.

## Proving

• **IS IT WISE** generally to use prototypes or advanced models?

It has been the experience of surface manufacturers that the prototype is an important check-out for changes. By establishing these prototype models anywhere from six weeks to several months prior to the production article, much is gained in learning, establishing initial cycle times, debugging the change and finding corrections which might be made before the article goes into production.

Many initial problems can be solved by using methods and constructing test pieces. Advance work eliminates many modifications to changes at a late date.

## Approvals

• **HOW CAN APPROVAL** on a change be obtained faster, to avoid a later change of the effective point?

It is generally agreed that this is a big problem, since it is obligatory, in most cases, for companies to review cost and customer specification approvals before proceeding with the work. Delay in getting approval is a reasonable length of time, usually spent previously established. Low time, and in

turn, costs a revival effective point must be established. Methods must be found in each company to stimulate initial approvals to overcome this difficulty.

One approach is to cut down the number of company approvals required on the engineering change proposed document. More pressure must be exerted on the customer to release the approval.

In some companies, a rush advance change approval can be received by telephone or teletype to allow the manufacturer to get started while waiting for final approval to arrive.

In some change cases, the company must take a risk, depending on the importance of the change and its effect on the product and, if conditions warrant, it can have to proceed with the change without approval.

## Minor Changes

• **IS IT NECESSARY** to control minor changes and determine their effective points?

Many companies report that they use expensive controls to check such minor changes (those which are not contradictory or do not affect safety, utility, or interchangeability) and establish effective points. In addition to expense involved, a considerable amount of follow-up is involved.

Several suggestions are recommended. Review minor changes do not affect interchangeability, it is not necessary to resort to elaborate detail. It may be feasible to expense control in respect to work lot or by visiting until the existing situation is satisfactory. Type of control for minor changes

depends upon the type of operation within a company, but many measures can be taken to decrease the kind of review and to let minor work through the system on a more normal basis.

## Cost Factors

• **HOW ARE ACTUAL COSTS** of changes determined, as compared with estimated?

In some companies, actual time tickets are used to gather the various elements of cost—engineering, tooling, labor, shop labor to stamp at a customer of actual cost versus the estimate. Frequently, the time ticket method becomes very cumbersome and requires too large expenditures.

Another approach is the use of budget—placing additional allowances into the various departmental budgets, and thinking to this line.

It is suggested that one of the most practical methods is to make sure that experienced people do the estimating, by comparing costs and estimates over a long range on a general basis, a trend can be established as to actual cost conditions.

Another recommendation is that companies which have serious cost problems should arrange to work with other companies which have found successful methods and techniques also.

• **ISN'T IT NECESSARY** to have cost data when advancing change proposals?

Yes. Cost figures will have to be based on the best system of estimating. Advanced cost data usually can be obtained to obtain advanced customer approval in order to expedite the company line of a change. How, for a company, might proceed on advanced approval will depend upon its policy.

• **DO "FOLLOW-ON" REVISIONS** to a change usually waste cost?

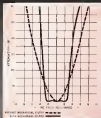
Generally, yes, since the following revision means modifying at a previous price something which has just been manufactured. One way of limiting these revisions would be to investigate the steps taken in the development of the change, to see that more allowances are made for testing and prototype work.

Another approach is for production engineering people or others familiar with tooling and manufacturing processes, to pre-approve engineering drawings prior to release, suggesting to the design engineers production expense levels at the outset of the design. This will, to a degree, assure that when the drawings are released the parts can be tooling and made properly.

## Special Shops

• **IS IT MORE PRACTICAL** sometimes to use shops, other than production

# The Collins Mechanical Filter for MAXIMUM SELECTIVITY



They've expanded airground radio communications here greatly to correct the problem of adjacent channel interference. It has become increasingly difficult to control adjacent channels and maintain good channel selectivity.

Collins has solved these problems by incorporating their mechanical filter in the Collins 100-4 HF Transmitter/Receiver. The mechanical filter, recently developed by Collins, "eliminates" the unwanted channel — reduces undesirable adjacent signals — greatly increases channel selectivity — practically eliminates adjacent channel interference. The effect of the mechanical filter on the 100-4's selectivity is clearly shown on the accompanying graph.

Collins 100-4 provides both receiving and transmitting facilities — up to 1000 crystal controlled frequencies arranged anywhere in the range of 2.0 to 16.5 mc. Transmitter output, normally rated at 100 watts net at 1000 mc, is sufficient to insure communication over very long distances. Full range control is provided over a positive 36-watt p.p.s. arc. The proven performance of the Collins 100 Trans-system coupled with the increased selectivity afforded by the mechanical filter in the 100-4, offers to reach the most advanced transmitting facilities anywhere available today.

If you have only a Collins 100-1 or 100-2 Transmitter/Receiver, contact Collins in your Dealer to arrange for an modification to include a mechanical filter.

For complete information and technical details, contact the Collins office nearest you.

**COLLINS RADIO COMPANY** Cordor Repairs, Inc.

11 W. 42nd Street,  
NEW YORK 36

1842 Midway Blvd.,  
BALTIMORE 2

5700 W. Olive Avenue,  
TOLSON

COLLINS RADIO COMPANY OF CANADA, LTD., 74 Spadina Street, OTTAWA, ONTARIO





## Stymied by a bellows assembly design problem?

Let this engineer help you!



Mr. A. H. Foster, our engineering staff, specialist in bellows applications.

• Whenever your problems on bellows assemblies, this specialist can give you answers that will save you time, trouble and money.

He'll know the advantages of metals to be considered for your application—brass, stainless steel, monel or nickel. He'll know the type of end fittings you should use. He'll recommend the correct bellows change—rotative liquid or gas. And he'll give you the right advice on many other factors that will help make your bellows design phase more efficient.

Sylphon and Bridgeport bellows assemblies are used in many ways—for thermodynamic devices, pressure controls, hydraulic mechanisms, expansion joints, or flexible connectors and in more applications.

Find out how our engineers can help you—and meet up the savings over half-cost of expensive and unproductive facilities elsewhere for you. Write for full information.

### SEND FOR FREE BULLETIN

An illustrated bulletin about metal bellows and bellows assemblies is yours for the asking. Send for free info. Ask for Catalog RA-100.



**Robertshaw-Fulton**  
CONTROLS COMPANY

FULTON SYLPHON DIVISION BRIDGEPORT THERMOSTAT DIVISION  
MINNEAPOLIS 7, MINNESOTA MINNEAPOLIS 7, MINNESOTA

flow drops, to get earlier effective points on changes?

Some companies employ a utility shop. This shop has specially trained labor qualified to make hand-made tools and hand-fabricated parts on a "one-off" production basis. It has been proved that, in some cases, secondary changes can be expedited by the use of these shops and shorter leadtimes realized.

There is, of course, a limit to this procedure because parts manufactured by utility shops are costly. It is recommended to wait, if at all possible, until production tooling is available and run parts through the company's own tool production facilities.

### Phase-In Control

• **HOW IS A DEVIATION** prevented after an effective point has been picked, when it is discovered that more creativity of the old part exists?

Minimizing the effective point must be weighed in each particular case. On changes of minor importance, the problem is not too serious. On major changes, once the effective point has been established, the company may have to hold it, even if this means changing inventory, where held with problems such as pricing, energy of the change, customer's desire, etc.

Strengthening of controls probably will help to minimize entering effective points. A good pre-planned layout that considers the entire system with respect to making and necessary points is the beginning will do much to control it. Also, checking arrangements to existing production and inventory controls is worth considering.

• **WHAT CAN BE DONE** in the early stages to guarantee meeting effective points?

In general, the best approach is a good pre-planning of all the factors involved in making the change, supplemented with meetings and jobbing of the change to the tool that is progressing.

In the early stages of planning, careful consideration must be given to make sure that all key points are considered—that the breakdown is correct, the flow time is reasonable, that all members of design groups are covered, necessary tools and jigs are available, and that procurement processes and manufacturing alternatives are well understood.

### Accessory Data

• **HOW DOES** an accessory manufacturer get changes in his parts accepted by customer or major substantially case-revisions, when these changes bring improvement?

Some opinion is that distance or major assembly manufacturers are so-



## THE EXTRA ENGINEER

When Fuel Measurement = Fuel Management

On aircraft equipped with Simmonds Fuelcon fuel gauge systems, there is available an "extra engineer" to relieve the flight crew of the job of measuring readings of fuel quantity into automatic management of the fuel remaining.

In addition to its accurate, dependable indication of fuel quantity, the Fuelcon system provides for a variety of fuel management functions, depending on the requirements of the aircraft.

Among these functions in recent installations are:

**CONTROL OF GRAVITY CONTROL** — automatic control of the distribution of fuel weight.

**LEVEL WARNING** — provides signals at predetermined levels for control of pumps, valves and automatic transfer switching.

**TOTALIZATION** — one or more cockpit indicators can show either total fuel aboard and/or contents of individual tanks or tank groups.

**REMEDIATION** — continuous transmission of information concerning available fuel for a remote reading, as from a guided missile.

**GUARD LIMIT CONTROL** — automatic control of fuel taken aboard in accordance with flight plan requirements.

Simmonds systems are flying today on 70 types of aircraft and with more than 30 U.S. and foreign flag airlines... all further proof of the leadership which has won Simmonds recognition as "first in electronics fuel gauging."

**Simmonds**  
AEROCESSORIES, INC.

General Office: Torrance, N. Y.

Branch Offices: ALBANY, N.Y. • DALLAS, TEXAS • FULTON, N.Y. • San Francisco Division: AIRBUS AEROSYSTEMS OF CANADA LIMITED-MONTREAL

*"For Happy Holidays"*

*it's EASTERN...*



*For Dependable Engine Lubrication*

*... it's SINCLAIR !*

Flying via Eastern Air Lines means "Happy Holidays" to thousands of vacationers. They rely on the fast, safe service of Eastern's Great Silver Fleet because the proof of its dependability is backed by billions of passenger miles. And Eastern helps to maintain these high standards by using the finest products available.

Eastern shows its confidence in Sinclair by using Sinclair Aircraft Oil exclusively for reliable service and maximum protection against engine heat and friction. Today, more than 45% of the oil used by major scheduled airlines in the U. S. is supplied by Sinclair. Why not place your confidence in Sinclair Aircraft Oil?

**SINCLAIR AIRCRAFT OILS**

Sinclair Refining Company, Ashtabula, Ohio 44004, New York 20, N. Y.

hesitant to accept improvements from accessory manufacturers, if the existing assembly is functioning satisfactorily. Sometimes, change is not welcomed because it may require more revision in drawings, affect spare parts, involve new testing programs, and upset an assembly line which has proved itself in long service.

Only if there is a considerable improvement in the product is there really any offset by the major contributions to streamline the change in the accessory, since accessory manufacturers feel.

• **HOW CAN ACCESSORY manufacturers obtain more recognition of their improved parts?**

One opinion is that more sales effort should be put forth. Also, that an incentive should be offered, either in the way of reduced cost or through an outstanding improvement of the product.

However, it is generally agreed that more effort must be made to take all ranges of the better ways being offered by the accessory manufacturers and to recognize them to make improvements.

Aircraft manufacturers recognize that it is difficult to have improvements in designs, but that can be very costly if more major changes must be made in the end product to suit redesign of the accessory.

One suggestion is the use of specific time type drawings which would offer

version improvements as alternatives. The specifications drawn would be the only drawing called out on the major manufacturer's installation drawing.

Whenever a new accessory became available and could be used directly, it would only have to be added to the new specification drawing.

One opinion is that when accessory manufacturers make changes, it would be better if the part is identified with the revision code and the part number left unchanged.

## Tooling

• **HOW IS ADEQUATE** allowance or lead time made for proving out tools involved in a change?

There are several approaches. First, adequate time should be scheduled for the manufacture and proving of tools initially, perhaps by the use of banks (A bank is a run of parts to check error in design, tool, and ergonomic techniques. Banks also give a stock of parts to draw from.)

Another approach is to start the new change into production at a slower rate, while working out the old part, thus keeping two lines running at the same time, gradually diminishing the old line and working into the new.

In many instances there is a lack of adequate time for proving tools as when revolutionary changes must be made. In such a case, proving will have

to be progressive and worked into production as frequently as possible.

In all progress, there will have to be tool correction time allowance.

## Simplification

• **HOW IS IT POSSIBLE** to simplify the complex, complicated controls which have now been established in most industries as compared with the real old-time aircraft systems of a direct relation between the engineer and the machine in getting a change accomplished?

Considerable overall control has crept into the industry as a result of expansion and this has a tendency to add cost and time in the incorporation of changes.

Simplified systems should be studied by all companies to improve steps taken in getting a change incorporated. Much can be done to institute shortcuts and reduce elaborate control systems.

Improvement programs will be easier to install in those companies which have more stable products, will be more difficult with other companies who are constantly making revisions in their products.

However, studies should be made aimed at increasing improved, number of people needed in support, is change, increasing order responsibilities to front people, and employing more versatile people with knowledge of the entire history of the change problem. Use of hand expediting methods also should be studied. —*Leslie Stone*

## Navy Contracts

Contracts recently awarded by the Navy's Aviation Supply Office, 700 Robinson Ave., Philadelphia 11, are:

**Boardside Co.**, Box 1110, Middlesex Ave., 3210 E. 12th St., Philadelphia 20, will supply on time/delivery and installation \$250,000 miscellaneous parts used on transporters and landing gear. \$10,000. —*Leslie Stone*

**West Engineering Co.**, 18 North 10th St., Philadelphia 10, has \$2.1 million contract for 100,000 parts.

**Western Systems Co.**, Archbald, Pa. 15610, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**Wheeler Co.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**United Aircraft Corp.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**United Aircraft Corp.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**United Aircraft Corp.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**United Aircraft Corp.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**United Aircraft Corp.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*

**United Aircraft Corp.**, 1000 North 10th St., Philadelphia 10, has \$100,000 contract for 100,000 parts. \$10,000. —*Leslie Stone*



## WHAT DAYSTROM HAS TO OFFER YOU...

UNDER ONE ROOF Daystrom Instrument can meet every one of your engineering and manufacturing needs—no other modern \$500,000 or so plant, where a full range of up-to-date equipment is available for manufacturing from raw materials to finished assemblies and systems... for complete electro-mechanical and electronic parts and assemblies in any quantity... for external, external, surface and counterline grinding, low to high precision turning, 10 bearing and milling, welding, heat treatment and finishing, precision gear and helical gear shaping, hobbing and shaving, straight and spiral bevel grinding, and tool inspection for entire range of gear production.

Daystrom's Research and Development Engineers have special skills in mechanism, in the assembly, electronic computer design and instrumentation of a similar nature... Daystrom's Production Engineers are specialists in the mechanical, electronic and electro-mechanical fields... Daystrom's Manufacturing Engineers are experts in tool design, processing and tooling methods a new, complete toolbox for producing tips, dies and fixtures.

Write today for our facilities report.



DIVISION OF DAYSTROM  
INCORPORATED



# DAYSTROM INSTRUMENT

ARCHBALD, PENNA.

## Affiliates

American Type Foundry, Inc., Elmhurst, N.Y.; Daystrom Furniture Div., Olean, N.Y.; Daystrom Electric Corp., Philadelphia, N.Y.



## First View of Bell Rocket Engine Line

As three-quarter model engine are detailed on Bell Aircraft Corp.'s Westfield, N.Y., assembly line. This is the first picture to show the assembly line and some details of the Bell rocket powerplants, it was reproduced from the company's 1951 annual re-

port. Bell saw a working out and two-shoulder model engine. The company builds the complete rocket system, including jet engine, propellant tanks, controls, the flow pump, water and propellant hose. Bell is making Bell's all-top-down model.



**LIVESTONE PILLARS** break up mine's interior into hundreds of change rooms.

## AF Plans Tool Depot in Old Mine

A western Pennsylvania limestone mine, for 20 years the site of a thriving machine industry, is destined to become Air Force's first underground warehouse tool storage depot.

Catholics in USAF's engine and airframe production program during the past year have killed thousands of government-owned tools. Many have been left in factory storage areas for quick use in the event of another industry emergency.

► **Space Shortage**—However, some firms with aircraft contracts, such as automobile manufacturers, lack sufficient space to store excess machinery once their contracts are awarded or completed. Tools for new contracts must replace the machinery in valuable factory areas.

Consequently, Air Force has had to find space in readily accessible locations to receive production quickly in the event of an emergency. USAF already has tool sheds in warehouses and closed plants at Grubb, Chicago and Marietta, Ga.

Latest storage area proposed is Midway Portland Cement Co.'s abandoned limestone mine 13 mi. southeast of New Castle, Pa. 88 Air Force Secretary Harold E. Talbot approves the \$5 million project, an appropriation is expected to be included in AF's 1955 budget.

► **Advantages**—Chief advantage of the 140-acre mine is its location in relation to various industrial regions and main transportation arteries. It is situated on the Pennsylvania Railroad a few miles from the southern end of the Pennsylvania Turnpike, within 50 mi. of Pitts-

burgh, Detroit, Chicago, Cleveland and New York are within a day's shipping time.

Caves have been found unsuitable for storage purposes. Tempera-



**INTERSECTIONS** 14-ft clearance. Note how convenient of this point.



**CAR IS SHOWN** by a pilot, providing good scale of cave's size.

ture can be controlled simply. Underground property is chosen to lay, and the embankment of earth and rock provides protection from air attack. The Midway mine is covered by a 200-to-300-foot layer of stone.

USAF uses the use of available means as economical, because it saves building new storage facilities.

► **Survey Made**—An architectural engineering firm, Michael Baker Associates of Rochester, Pa., made a survey of the Midway mine last year under a \$454,455 Air Force contract. The company suggested construction of a concrete flooring for the entire mine and installation of concrete block to close up existing limestone walls.

The solid limestone roof of the mine is supported by massive stone columns. Just 50 ft in diameter, which strike about 900 yards between the columns. The main pillars of the mine extend back approximately one mile.

In addition to the construction of tenting, dehumidifying equipment will have to be installed to keep the temperature constant. Water now is being pumped out of a hole located at the top of the mine. Silica gel will be used to dry out the damp interior air.

► **Full Line Planned**—Rushmore must be built leading into the mine and connecting the 13 caves. Road will be had to facilitate handling of the big tools the mine will house.

Following full USAF and emergency support, it is expected that the first tools will be sent to the abandoned mine within a year.

Air Force plans to buy the mine and adjacent surrounding area to build new roads to the entrance. The farmland covering ground probably will not be included in the purchase.

Construction contracts are expected to be let sometime this fall. A contract there will be chosen to handle delivery of the tools to the mine and their maintenance.

## PRODUCTION BRIEFING

► **Incorporate Products, Inc.**, Wilmette, Ill., is a new firm producing fused-silica pipe, based on new products of polyimide resins under the Inframate trademark. The material is applicable to thermal and electrical insulation, radome cases and furnace gas.

► **Pontabak Aviation Corp.**, Los Angeles, has engaged its administrative facilities added a 60,000-sq-ft bay to house its heavy new equipment, put in additional tool-drawing and welding equipment and given the engineering department a 4,000-sq-ft building to aid plant research.



He's the fellow that first 'em. Like the humbucker, he probably doesn't worry about the laws of aerodynamics. When he's at the controls, all he wants to know is how well they work. If he's not satisfied, you'll hear about it.

More than ever before, pilots today must be able to depend on the quick response of sure steering controls. And Saginaw Ball Bearing Steers, in the steers of airplanes, wing flaps, tail surface controls and other vital parts on modern jet fighters and bombers, assure easier movement of aircraft controls. These efficient steering assemblies transmit the story to lower lines through rolling steel balls with only a fraction of the torque required for ordinary thread-to-thread screws. They are compact and low in weight—strong nuts.

Saginaw Steers can be supplied in a complete range of load and life requirements for use with electrical, hydraulic or pneumatic units. Write today for our free engineering data book.

**Saginaw STEERING GEAR DIVISION**

GENERAL MOTTOR CORPORATION, SAGINAW, MICHIGAN • MANUFACTURERS OF SAFETY POWER STEERING

Nothing Missing  
in the  
**LINK!**



Link 16-Fradline Gear Box, one of many in the Flight Simulator, shows the New Departure ball bearings that mount accurate gear pulleys under . . . almost entirely without backlash and friction.

Take off . . . rough weather . . . enemy aircraft . . . Link's F-6073 Jet Flight Simulator provides nearly every flight situation without getting off the ground. Extensive use of New Departure ball bearings throughout assures the same operational characteristics, the same smoothness and accuracy, so essential in actual aircraft equipment.

These high-precision ball bearings provide low starting torque, very low running friction and exact location of vital parts, irrespective of operating position.

If you design for aircraft equipment, it will pay you to talk to your New Departure engineer, today!



LANDING SHIP is destination of this HHC-1. It lands on small platforms marked by rafts on its deck in the Pacific.

## Kaman Copters in Action on Two Oceans

Here are first photos showing three-place Kaman HHC-1 copters in first service. Powered by a 240-hp. Lycoming, the HHC-1 features intermeshing rotors.



AIR RESCUE training mission is carried out in Hawaii by HHC-1 which hoists while "victim" clings to ladders.



SEAPLANE TENDER in Pacific was "out of roll" for the HHC-1 shown during "Operation Sea Jump."



LSV (Landing Ship, Tank) operating with the first in the Atlantic served as a base for these two HHC-1s.

## Skin Sensors Control B-47 Anti-Icing

Disks in leading edges tell electronic regulator when to bleed hot air from jet to prevent ice buildup.

A new type of system for reducing greatly jet lead-ins has been perfected and is now being produced by United Control Corp. of Seattle.

Already being installed on the Boeing B-47, the system also has its pilot from the compressor action of the plane's turbojet engines to utilize the wing and compressor thoroughly.

Now known as the type of sensing elements, which demand heat for the surface as needed. Galileo receptors, the units are silver disk-size elements in disks which contain 18 ft of metal fine wire. Electrical resistance of the metal from which the wire is drawn changes as the temperature varies. So temperature variations in the disks, located in the leading edges of surfaces needing anti-icing protection, cause fluctuations in a small electric current passing through the wire.

These current variations are sensed by a specially built electronic regulator which interprets the changes in terms of the surface's heating requirements. If heat is required, the regulator controls a modulating valve to divert hot air from the plane's jet exhaust to the surface in need of heat.

The hot air is piped under pressure through stainless steel ducts (the air, as it emerges from the compressor, was

be as hot as 700 F) and is sprayed on the outer surface of the leading edges through a series of small perforations in the ducts. Air films build, though a number of small passages along the entire surface.

**Permanent & Versatile—United Control** says. The installation characteristics of the Boeing system are reported to be excellent, with controls sensitive to surface temperatures within five degrees of the 100 F control point, regardless of ambient conditions.

The manufacturer says the system could just as well be used to control cooling equipment to reduce temperatures on temperature-sensitive surfaces whose optimum speeds occur below 12,000 sufficient heat to cause strength deterioration of many materials used today.

**Light & Efficient—The control** components required to sense the wing of a jet bomber weigh less than 1 lb, according to United Control. By reference the entire anti-icing system probably weighs less than 10 lb.

The advantage of the sensing devices, which have been built small and light, is that they can be manufactured in almost any size or number configuration, which allows them to be built wherever wherever needed on the plane's skin.

with no effect on the aircraft's aerodynamic efficiency or structural integrity.

The system is simple with the hot compressor air, all bleed off in the large quantities, the engine can suffer serious power losses. Operating on demand, the anti-icing system bleeds off hot air only when the surfaces need it.

Systems demands of the pilot are minimal—he merely throws an instrument panel switch to "on" which sets into operation protection is needed and the system automatically takes over.

The anti-icing device is also its own safeguard. Because it is continuously sensing area and structure temperatures at several critical points, danger of possible overheat because of an oversupply of hot air is eliminated, according to the manufacturer.

**Even at Boeing—Boeing** says that the system came into being when its engineers were confronted with the problem of clearing jet, compressor bleed air throughout the aircraft and air handling its effects on the plane's structure.

"Boeing equipment engineers came up with the notion as the focus of electrical receptors, sensitive 'terminals' which constantly take the temperature of the boundary surface during flight using conditions," the aircraft maker says.

When the specifications were drawn, the job of protecting and producing the system's components was turned over to United Control Corp., a Boeing subcontractor in Seattle which specializes in the development and manufacture of automatic control devices, Boeing says.

## Infrared Treatment Speeds CAP Repairs

Capital Airlines now gives its engine cylinders infrared heat treatment to expedite them for valve seat and insert removal.

Using advanced CAP units with the previous used air tech system is a 10% increase in assembly production, saving of 25 man hours a week, together with cleaner and cooler working conditions.

The infrared system also permits faster operations, because of identifiability while heat control and easy adaptability to all types of cylinders that are going through CAP's shops. Also the unit one of the crew saves considerable floor space.



**REGULATOR** (left) senses radiating signals from sensing disks in duct



Through solid space to remove all gasses and contaminants, Ryan exhaust systems give jet engine life on Boeing transport planes.

When Pratt and Whitney needed an exhaust system of unique and revolutionary design for the 3500 BHP Wasp Major engines which power Boeing Stratolifters, no one but Ryan would tackle the job of development and manufacturing. The design demanded production of one-piece stainless steel stampings larger than any ever before used in exhaust systems, and many other advanced features. Ryan solved these problems by creating completely new tooling, welding, and other techniques... and today produces this complex, precision structure on a high volume basis.



Ryan assembly gives life span protection to Pratt and Whitney exhaust systems.

industry's requirements. Ryan also builds thousands of constant control exhaust parts for U.S. combat units.

The only exhaust system manufacturer who also designs, builds and flies high-performance aircraft, Ryan leads the world in this specialized field. And because Ryan is experienced, dependable and accurate it has been able to call upon its vast store of 31 years of experience in many related fields of aviation to serve all its customers better in their special requirements.

## RYAN AERONAUTICAL COMPANY

Factory and Home Office: Lindbergh Field, St. Louis 10, Missouri  
Other Offices: Washington, D. C.; Dayton, Ohio; Seattle, Washington; New York City



"Always a Better Product" is the key note of Ryan where developmental research never ends.

**—RYAN—**  
\* SPECIALIZED \* INGENUOUS \* VERSATILE

Advanced Type Aircraft and Components  
Jet and Rocket Engines and Components  
Control Systems for Aircraft  
Development Equipment  
Devices for "Hot Parts"  
Weapons Systems Design and Development  
Aircraft and Power Plant Research  
Metalurgical Inspection  
The Hot Gas Turbine  
Gas Turbine Engines

Planners in Each \* Leaders in R&D



1 Standard Constant Speed Transducer  
2 Fuel Inlet Valve (Constant Speed)  
3 Spring (Fuel Inlet Valve) (Constant Speed)  
4 Fuel Inlet Valve  
5 Fuel Inlet Valve  
6 Fuel Inlet Valve



CONSTANT-SPEED drive, made by Sundstrand, on J40. Bottom view is shown.

## J40 Mounts Integral A.C. Drive

The first constant-speed accessory engine to be built into a turbojet aircraft engine is on the Westinghouse J40, the company's Aviation Gas Turbine Division says.

By making the drive integral with the engine, Westinghouse claims it saves about 120 lb over the weight of other types of drive installation of equal power. The engine weight itself is reduced by 60 lb by addition to the drive.

By integrating the constant drive's oil system with that of the engine, there is a saving in the weight and space of a separate oil reservoir, independent hydraulic lines, and separate oil pump and cooler.

The constant-speed drive is manufactured by Sundstrand Aviation Div. of Sundstrand Machine Tool Co., Rockford, Ill. On the J40-40-100 thrust J40 delivers 40 horsepower maximum output at 70 hp (for 30% of operating time). Continuous full-load output is 55 hp. The unit produces throughout 400-cps

alternating current. It gives a constant accessory drive speed of 6,000 rpm, achieved before the engine reaches full speed and returned up to the power plant's full military speed.

The alternator's frequency is held to within  $\pm 1$  cps under steady speed and load conditions and  $\pm 4$  cps under rapidly transient conditions.

Overload ratings are 300 hp for five minutes, 440 hp for five seconds.

## Liquid Detector Uses Thermistor Probe

A new sensing control that detects the presence of liquid is less than a second and reacts in its shutoff in three seconds has recently been introduced. Only 625 in. of the instrument's probe need be inserted in withdrawal from the liquid to cut off the machine, says the manufacturer, McDermott Water Systems, Inc.

The system is made up of three parts

—a small probe containing the detector's heart, a thermistor; a power control unit, a connecting cable. No vacuum tubes are used. The system is built to withstand space shock and vibration as well as various environmental changes.

Among the manufacturer's suggested applications for the liquid sensing control unit is a level-off sensing indicator or high-level cut-off switch to operate visual or aural alarms, control pumps, valves or motors in response to liquid level changes. Separated lead lines from succeeding units in the field level sensing each tank enables a probe-to-must level.

Pushes and power control units are available in a variety of assemblies. Aircraft models conform to applicable portions of MIL-E-3271A and MIL-F-5015 (ASG) specs, according to the maker. All models can be supplied to operate either on 115 v. d.c. or 115 v. a.c.

McDermott Water Systems, Inc., Control Instrument Div., 514 Cassara St., Trenton, N. J.

## OFF THE LINE

American Airlines and TWA will lease over 35-acre plots at Los Angeles International Airport for a 50-year period. Plans now are being drawn up for capital improvements to be erected on the leased grounds. These will revert to the city at the end of the lease. Annual rental is set at \$35,210 each. Effective date is June 1.

General Article . . . The engine leaves and in the decorative panels of Trans Canada Air Lines' Super Constellation are the greatest articles. They were gilded and mounted between two sheets of plastic for display purposes.

Trans Canada Air Lines' first Lockheed Super Constellation flew from Berkeley, Calif., to Montreal nonstop in 7:03 hr., carrying 321 passengers in its delivery flight, according to TCA.

The Aero-Craft Division of Glass Fibers, Inc., whose Baraback, Calif., plant was completely destroyed by fire last year is back in full production, the company reports. Plant laboratories using thermal and accelerated products for aircraft use.

Airline Electric, Ltd., Montreal, soon will start a \$120,000 plant at Vancouver International Airport to be called Avion Electric Pacific, Ltd. The plant will handle aircraft instrument and accessory repair and will employ some 60 techs under the supervision of three techs.

## New, tougher marking material passes supersonic adhesion test with flying colors!

In use on the latest and fastest supersonic fighters and test planes!



"SCOTCHCAL" Film No. 450 — an extremely tough marking material — saves both time and money on marking jobs, gives longer lasting, more attractive markings for any plane — military, commercial, or military. Exclusive adhesive formula lets you apply numbers and markings in minutes instead of hours. And the firm-bonding adhesive doesn't let go — keeps markings of "SCOTCHCAL" Film fresh and intact for many times the life of ordinary decals . . . even in severe weather . . . even at supersonic speeds!



**EASY TO APPLY.** Simply strip off adhesive pretreater, activate and apply. No drying time. Colors are true, fadeless, eye-catching. Pre-cut letters, numbers, and standard borders and designs available. This is time-saving, labor-saving, cost-saving marking!

**SPECIAL HEAVY DUTY MATERIAL, NO. 450.** . . . weight rate of . . . marks which would be tearing, chipping, rubbing or peeling under the most severe conditions of supersonic flight.

Send for FREE SAMPLE

Reg. U.S. Pat. & TM.  
**SCOTCHCAL**  
BRAND  
FILM



Made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn. Plant 20. Brand name "Scotch" is a registered trademark of "Scotch" Corporation. "Scotch" is a registered trademark of "Scotch" Corporation. "Scotch" is a registered trademark of "Scotch" Corporation. "Scotch" is a registered trademark of "Scotch" Corporation.

MINNESOTA MINING & MFG. CO.  
Dept. 6W-6  
St. Paul 6, Minn.  
Please enclose a sample of "SCOTCHCAL" Film with application information.  
NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_

**about  
TURBINE  
WHEEL  
BROACHING**

There's no instance where LAPOINTE engineering resulted in the saving of time and money, tools and machines, because of an interchangeable future.

**TWO TURBINE WHEELS**  
with different diameters, with ribbed  
and 4 branch "petal" ribs along, were  
BUSHED WITH THE SAME RUBBER.

50 YEARS IN BROADCASTING /

© 1999 : 0004-9194/99/0000-0000-0000

**Ballou AF-17** describes Latitude, Bearing, Heading, Time, and Position that will help in efficient pre-departure assignments in your class.

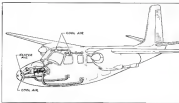
**LAPORTE**

MACHINE TOOL COMPANY

[illegible]

THESE HIGHLY SELECTED ARE LARGELY UNAVAILABLE  
IN UNCLASSIFIED VERSIONS AND CONTAIN

## NEW AVIATION PRODUCTS



IMPROVED HEATING and ventilation is claimed for new system in Auto Commander

## New Aero Commander Heat Setup

Acro Design & Engineering Co. is working development of a new, lighter and recubling system for the Acro Composites business market.

Bottom heating is said to have been brought about by the mounting of the heated 5-25 combustion heater in the rear of the two-engine plane. The reportedly gives better air flow through the furnace than was obtained previously when heater was located aft of the big prop. cylinders forward.

The new installation provides a constant temperature level in the cabin, against ADME. Some windshield de-

finding also is obtained, as a result of increased correlation of heated air flow behind instrument panel.

New heat vents in the Aero Core  
resister are located adjacent to each  
seat, and are individually controllable.

For instance, a new fresh air vent being tested takes in the air through a new scoop located above each passenger window. The air is ducted along top of cabin on each side to the vents at each seat location. Other seats are located on the lower forward cabin, and

Aero Design & Engineering Co., Box  
112, Bethune, Okla.

### New Contour Projector Features 30-in. Screen

A new circular projector with a 30-in. viewing screen and a 14-in. projector designed for routine product or film pricing have been announced by Kodak Co.

The large unit, Model 50, is extended its use both in precision microscopy and in the production line. Its size, says Kodak, permits easier inspection of complete parts and allows it to be used on sections of even larger parts.

The new unit includes the same optical features first introduced as Kodak's 14-in. prototype, such as choice of either shadow or surface illumination, ordinary moonlight operation, instant changes in magnification without re-focusing, and measuring 8-in. distance between the lens and the plane of the sheet under observation.

The new model also offers a staging area with a 17-in. front, 8-in. horizontal and 8-in. vertical table travel, a

built-in helix table with a swiveling rotation of 15 deg. off center in either direction for setting helix angles. Other features: horizontal and vertical micrometer graduated to .00005 in. over three scales 1-in. range, a direct reading screen for angular measurements, a built-in 1,350-w. light source for surface inspection of cracks, blind holes, and

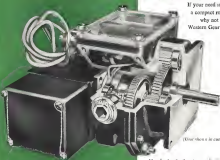


## Really Versatile

**this WESTERN GEAR  
ROTARY ACTUATOR!**

This versatile rotary actuator has been modified for many custom applications, ranging from dropping wing-tip tanks to opening and closing camera doors.

If your need is for  
a compact rotary unit,  
why not investigate the  
Western Gear Model 1574.



(Show where it is answered)

CHINESE TITLE: 中国公民出境旅游须知

## May 1984

110 volt single phase 400 cycle remanable motor with brake. Horse 1/2, 10 000 RPM input — 12,000 cycle 110 RPM output enveloping 500 cubic inches of torque. Slipping tolerance plus or minus 75 degrees. Overheat to 40,000 feet altitude. Thermal protection. Chemical compatibility or equipment include weathered thick corrosion base coat. B C motor.

Hundreds of other type units in prototype, as linear and rotary designs, are available as well. Call us now for the no-obligation service of a skilled Western Gear application engineer.

Executive Office, P.O. Box 102, Lomax, California  
 Examined, February 2, 1964, by Special Agents

**WESTERN GEAR**

**PACIFIC WESTERN PRODUCTS**





**MORE  
FLIGHT HOURS**



**BETWEEN  
MAJOR OVERHAULS  
WITH NEW**

**KOOLMOTOR  
AERO OIL**



The Additive-Type Oil  
Approved for Commercial Airline Use

New Koalmotor Aero Oil—the additive-type aviation oil approved for commercial use—is a compound of Cities Service quality-refined base oils plus a non-cub forming additive that reduces coke formation, valve guide wear, varnish formation and wear-all engine wear. The light and heavy ends of the crude oil have been removed by the exclusive "Hebert" process, leaving an oil with a low carbon residue, fluid at low temperatures, and with good heat resistance, thus cutting down oil consumption. This means more flying hours between major overhauls and less maintenance spent when overhauls are necessary. Koalmotor Aero Oil—ideal for private as well as commercial aircraft.

**MINI HEAT RESISTANCE    LOW CARBON RESIDUE    LESS ENGINE WEAR    LESS OIL CONSUMPTION**

For safer performance, less engine wear, fewer repairs, and lower oil consumption, ask your local airport to supply this new and superior grade of Cities Service Aviation Oil.

**CITIES SERVICE AVIATION PRODUCTS**



New York • Chicago • In the South: Arkansas Fuel Oil Corp.



**TYPICAL ROCKER BOXES** after 1150 hours and 1500 Take-Offs using Koalmotor Aero Oil. Rocker boxes prepared to keep engines cleaner in controlled flight tests at all altitudes under all weather conditions.

service details with the Kodak Normal Reflex Illuminator. Shadow projection dimensions are provided by means of a 500-w light source.

Six interchangeable lenses are available with the 11-in. projector at 10x, 15x, 214x, 30x, 434x and 100x, any of which may be mounted in a selected turret to provide instant change of magnification.

Projection lenses and mirrors are mounted on a single assembly, providing maximum rigidity and alignment for close work even under rigorous shop conditions.

Eastman Kodak Co., Rochester 4, N.Y.



AIR CHAMBER at test operator's operation

#### Air Actuation Speeds Operation of C-Clamp

An articulated C-clamp has been introduced by Bendix Co. that reportedly increases production by as much as 15% or more on bench and tool work.

That is made in one standard size, with optional special sizes available. The standard model has an opening of 6 in., with 3-in. throat and 2-in. plunger travel, closing to that position with 100 lb. thrust on a line pressure of 100 lb.

Company reports that 100 of these clamps have been order test run by aircraft manufacturers for over three years, with standard production increases of from 15% to 50%.

An chamber and valve are integral part of the clamp at its base. Quick connection is made with the air hose. A lever valve on the air chamber controls release and griping action of the clamp. Self-adjusting head helps provide even pressure.

Bendix Co., 1419 Glenview Blvd., Los Angeles

AVIATION WEEK, May 24, 1954

Here's one more way

**MB assured  
engine mount  
durability**



The photograph shows how MB vibration isolating mounts were put to a grueling fatigue-strength test . . . to check the complete dependability of these vital engine supports.

A mount was bolted between two hanging steel beams. Whichever was applied by means of the MB vibration camera shown. When removing, the beams developed tremendous forces—enough to rupture any heavy part into revealing structural faults.

This MB-originated equipment actually applied over a billion load cycles in the development of this single mount design alone. Result: Years later, still in reports of constant trouble in service.

It's the wider scope of vibration engineering that puts MB apart in its field. It shows up in quality of product.

**the MB manufacturing company, inc.**

1000 East 10th St., New York 11, Conn.

HEADQUARTERS FOR PRODUCTS TO ISOLATE VIBRATION

TO EXCISE IT . . . TO MEASURE IT

## Control Asbestos Fabrics Seal Fireproof Openings

Control asbestos fabrics for use in seals on openings in fireproof of aircraft engines are being introduced by Raybestos-Monahan, Inc.

Five R/M asbestos sealed fabrics have been tested against a 2,000°F flame for 15 minutes with no signs of penetration or degradation, test manufacturer. The other five meet Civil Aeronautics Administration and Air Force specifications for this purpose.

Because of their fire-resistant properties, the fabrics are said to be well suited

for sealing engine air intakes, exhaust openings, oil and lubricant seal control and openings, and air duct and pressure control openings.

Raybestos-Monahan, Inc., New Britain, Pa.

## Internal Shaver Finishes Spur and Helical Gears

Prepress finishing of internal spur and helical gears is the job of National Branch & Machine Co.'s new Model 512R gear shaver.

The tool will take gears with pitch diameters from 3 in. to 12 in., up to

five diametral pitch teeth and face widths up to 24 in. Shaving is accomplished by the cross-hair gear cutter. Work is completed on driving lead with its arm in a horizontal plane. Shaving rollers engage the work gear with the center cutter too set at correct arc angle with the work gear.

Model 512R is a vertical, push-type shaver operation, with an optional gearing fixture to facilitate loading and unloading of gears with wide faces or integral hub shafts.

Three motors are used with the machine: a 1-hp. unit drives the work spindle, a 3-hp. unit drives the cutter reciprocating mechanism, a 4-hp. unit drives the gear-type coolant pump.

Dimensions of the machine: 62.5 in. wide, 59.5 in. deep, 64 in. high.

National Branch & Machine Co., 5605 St. Jean Ave., Detroit 13, Mich.

## ALSO ON THE MARKET

American carburetors, designed to physical and operational characteristics of equivalent engines, have passed rigorous proof after extensive drop, shock, impact and vibration tests. A two-way pressure relief valve is built into each carb, if required. Pressure type compression lockers ensure water-tightness, and secure to carburetors—Carg, Machine Co., Danvers, Mass.

New live cracker design reportedly eliminates "cold weld" problems and reduces overloading to minimum, thus decreasing vibration and chatter and increasing machine capacity. High relief and thrust loads are accommodated by the three sets of bearings within the tool. Two sets of needle bearings around the specific mechanism maintain accuracy to within .0002 in. The fixed, a ball-type thrust bearing, further increases cracker's capacity to withstand heavy loads. Its rotating, movable part is a powered pin spring, unit stabilization, which automatically compensates for expansion and contraction due to heat.—Nash Manufacturing Co., 1515 S. Highway 23, North Plattefield, N. J.

Blat shavers reportedly provide completely dust-free cleaning. Called V-B Jansen, it is lightweight and portable. It provides blast cleaning for all welding operations, for spot cleaning and touch-up work in gas-tight plant maintenance work. It uses all types of abrasive and operates from standard compressed air.—Vacuum Blast Co., Belmont, Calif.

Eight jet jets against the solvent in a 40-gal. solvent-shower recently put on the market. Cost attaches quickly to any air hose—Carg, Machine Co., 6335 South Central Ave., Los Angeles



## America's first production B-52 rolls out!

The debut of America's greatest added strength when the first production B-52 rolled out of Boeing's Seattle plant. Behind this historic Stratofortress, other giant B-52s are taking shape.

At the roll-out ceremony, General Nathan F. Twining, Air Force Chief of Staff, described the Stratofortress as "the long rifle of the air age." The very essence of these global jet giants is a powerful, detested spearhead, for they are designed to deliver devastating ordnance blows deep behind an enemy's frontier.



This must be greater at the Boeing Air Research and Allied Laboratories. It is based on each Boeing model in the B-52. It is 30,000-100,000 and also in the B-52.

The Boeing Stratofortress is capable of carrying nuclear weapons. It has a gross weight of more than 310,000 pounds and measures 157 feet from wing tip to wing tip. It is 151 feet long, and its towering 65-foot tail folds down to pass under hangar doors.

Power is supplied by eight Pratt & Whitney J57 jet engines installed in pods below the wing. Performance details of the B-52 have not been revealed.

So promising was the original Stratofortress design that it was ordered into

production months before the first experimental model had flown. In 1952, two prototypes began intensive flight program.

They have proved themselves as well as what the Air Force declared the airplane "ready for expanded production." Boeing's Wichita (Kansas) Division was designated the second source of B-52s.

Once again Boeing's pioneering design, research and production have added new strength to America's arsenal.

**BOEING**

**Gladden**  
**in-line-relief valve**  
(Also used as Priority, Choke or Pressure Sequencing Valve)

*Now in production*

**Design features:**

- Weights covers 337 pounds
- Fully adjustable and adaptable
- Single internal relief pressure adjustment
- Excellent venting action creating characteristic by high deceleration pressure

**Offices in principal cities:**

Atlanta, Ga.	Boston, Mass.	Chicago, Ill.	Dallas, Texas	Denver, Colo.
Detroit, Mich.	El Paso, Texas	Fort Worth, Texas	Houston, Texas	Los Angeles, Calif.
Memphis, Tenn.	Minneapolis, Minn.	New York, N.Y.	Phoenix, Ariz.	Portland, Ore.
San Francisco, Calif.	Seattle, Wash.	St. Louis, Mo.	Tampa, Fla.	Wichita, Kan.

**Gladden Products Corp., 635 West Colorado Blvd., Glendale 4, Calif.**

# What kind of check valves do you need?



**Parker offers widest variety available . . . builds more than all other sources combined**

"What system . . . fuel, air, hydraulic, acid? What size, what type of check valves do you need? For an economical, dependable solution to any design problem, specify Parker check valves every time", says Frank Cowdry, Chief Engineer of the Check Valves and Fittings Division at Parker Aircraft Co.

"A quick look at our shipping records would show you the amazing variety of check valves we ship each year. We build everything from standard sizes to special custom-made models. They vary from 1/8 inch to 2 feet long. They're made by many different processes: casting, die casting, spinning, welding, etc. And, these check valves have proved to be so good we build more than all other sources combined.

"Why has Parker been the top name in check valves for over ten years? Our long-time customers supply the answer. They know they get safe, dependable valves. Long ago the bugs were worked out . . . and design improvements are being continuously made.

"If you're not already using Parker check valves, why not call us for detailed information. We'd like the opportunity of showing you features and benefits. Simply contact us at this address."

**PARKER AIRCRAFT CO.**

3527 W. Century Boulevard, Los Angeles 43, California.  
Subsidiary of The Parker Aircraft Company

**Parker**  
Hydraulic and fluid  
system components



Send to Parker Aircraft Co., all inquiries for aircraft components. Both sales and engineering are now at this one location in Los Angeles . . . offering faster service.

These modern manufacturing plants are now at the Los Angeles International Airport. Check valve plant is shown on the left, hydraulic and fluid products plant on the right.



What other Parker components for hydraulic and fluid system assist you? Parker Aircraft Co. builds a wide variety of engineered products for different applications.

**PARKER AIRCRAFT CO.**

Section 300-C

3527 W. Century Boulevard

Los Angeles 43, California

Please send me the following information:

☐ Information about Parker check valves.

☐ Information about these other specific aircraft fuel or hydraulic products.

NAME

TITLE

COMPANY

ADDRESS

CITY

**Mail this coupon today!** Be sure to check the information desired. If you have questions about any other products, please write to Parker at the address shown above.

***DC-6 BLUE RIBBON AIRCOACH***

NDW SERVING SAN FRANCISCO/OAKLAND AND PHILADELPHIA



### Typical American Airlines Aircoach Fares

New York—San Francisco/Oakland	\$99
Los Angeles—Chicago	\$76
Philadelphia—Los Angeles	\$98
Washington—San Francisco/Oakland	\$98
Mexico City—Chicago	\$76
Oakland/San Francisco—Philadelphia	\$98
Detroit—Los Angeles	\$86
New York—Phoenix	\$94
Boston—Chicago	\$40

American Landing Airlines

**AMERICAN AIRLINES** INC.

The Finest in  
LDW-CDST TRAVEL!

- regular scheduled service with dependability at the lowest fares available
- economical for families—often costs less than full coach or travel by car
- quick, clean, comfortable—ideal for children—avoids days of monotonous travel
- features some 300 mph pressurized DC-6's used for higher speed flights
- Blue Ribbon Service with the regular American flight crews and maintenance

## WHAT'S NEW

## Telling the Market

**17** **1700** Data sheets No. 39 and 11 on about Motors Instruments Co.'s batteryless speed reducers. Address: 432 Lincoln St., Denver 3, Colo.

**18** **1800** New edition of *Motors Drawing and Document Production*, detailing *Kollsman* graphic reproduction materials, a new slide tape Electronic Kollco Co., Industrial Sales Div., Rochester 4, N.Y.

**19** **1900** Ceter dynamometers, with complete electrical and mechanical specs, are listed in Catalog T61 by Ceter Motors, 3615 N. Maplewood Ave., Dept. 1 Chicago 40, Ill. Free price catalog from E.H. Fryder, Inc., 1000 W. Belmont Street, Chicago 26, Ill. \$100-00; self-indispensable file book, which is a bargain, listing telephone model. Address: 4284 S. Erie Ave., Cleveland 3, Ohio.

**Processing Metal Forming** is a monthly directory listing manufacturers of metal fabrications. While C, H, K, Kump & Sons, Newark, Wyo., Maplewood, N. J., C&H tells about its Tri-Chad SS medium or three; new ballistics: GFA-6812, 18 pp.; drop-nail models: GFA-6812, 18 pp.; ballistics models: C&H-6812, 14 pp.; new meters: Winks General Electric Co., Schenectady 5, N. Y. Design details and specifications for computer's complete line of **knuckle** persons are given as Catalog K-55 published by Knuckle, Detroit From Co., 9121 S. Kensington, Chicago 16, Ill. The machine of **Knuckle** is distributed in 12 states: Buffalo, N.Y., put up by Knuckle Metal, Inc., 1797 S. 33rd St., Milwaukee 16, Wis.

### Publications Received

• **Aeronautical Engineering Catalog, 1974 Edition**—Edited by William A. Shewey, published by Institute of the Aeronautical Sciences, 2 East 64th St., New York 23, N.Y. 10022. Latest edition of this unique volume lists manufacturers, sources of supply and products for the aviation industry.

• **Anglisten - Dictionary, German-English-English-German**, by Friedrich Cieslowski, published by Klaus Runk Verlag, 2. Auflage, 1988, München 23, Germany. 440 pp., \$3.12. Book contains more than 10,000 terms of semantics and related subjects, pronunciation in English-German part in phonetic transcription.

\* **Characteristics and Applications of Resistor Stress Gages**—by U. S. Department of Commerce, National Bureau of Standards. *Standards Circular* 575. Pub. by Government Printing Office, Washington 25. D. C. 140 pp. \$1.50. Proceedings of symposium held Nov. 6-9, 1951, book contains 11 papers along with transcript of the discussion that followed on the study of resistance stress gages by stress loading conditions in the U. S. and abroad.

**DC-7 NEVER BEFORE**  
such Magellans... such Power  
such Performance!



and **NEVER BEFORE** has the  
A. W. HAYDON COMPANY been so  
proud of its contribution...

In the never-ending conquest of the vast barriers of space and time, Douglas goes ever forward meeting every challenge that men and machines must face. The newest — and brightest — star in the aviation firmament, the Douglas DC-3, is truly a miracle of the mastery of men over machines . . . and in this great work alone A. W. Hedges towing devices play an important part.

We at A. W. Haydon take pride in our contribution toward bringing a man of steel and machinery into integrated performance which meets Douglas' high standards. Integrated performance is born of a multitude of small component parts, working in perfect mechanical and electrical coordination. The A. W. Haydon precision timing instruments are a vital part of this vast network.



DOUGLAS DC-7, the ultimate in comfortable and safe air travel. Swift, luxurious, dependable — The new DOUGLAS DC-7 justly deserves the accolades it is receiving.

- ✓ A. W. Hayden Time Delay Relay is a very important component of the automatic prep feedwater system.
- ✓ A. W. Hayden Time Delay Relay: time duration of prep feedwater.
- ✓ A. W. Hayden Repeat Cycle Timer is a vital part of the prep diluting equipment.
- ✓ A. W. Hayden D.C. Timing Markers are used in the calcium precipitation system.

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 103–110



**A. W. HAYDON**  
COMPANY

© 2005 Blackwell Publishing Ltd, *Journal of Clinical Pharmacy and Therapeutics*, 30, 139–145

## 27



AIRCRAFT PRODUCTS DIVISION **SPS**  
MAINTENANCE PRODUCT RANGE

- 4) Economy of operation
- 5) Ability landing gear must be of its own configuration
- 6) Landing gear must be retractable, mainditch, and tail (tail, outrigger, etc. must be thermally insulated to assure oil neither expands nor contracts)
- 7) Minimum gear deflated weight should be as little as possible but must not exceed 41 000 lb
- 8) Overall dimensions must not exceed:  
12 ft in height, 77 ft in length, and 77 ft in width
- 9) The aircraft must be able to take off under full gross weight, at sea level with 100% fuel, and must be able to climb a 50-foot altitude at the end of a 4 000-foot runway with at least one passenger and equipment under one maximum gross weight
- 10) Fueling must be sufficiently large to provide:  
a) Sufficient volume of fuel and engine fueling complete dual controls
- 11) A dual fuel engine system located immediately behind and between the cockpit and cabin
- 12) A fuel system adjacent to the dual engine member's station
- 13) All controls must be located within the cockpit in a single plane, the controls to be by the main engine without disturbing its normal operating position
- 14) All controls must be located by manual proximity of all of the flight crew station controls as possible, to enable crew to reach flight controls
- 15) A single integral emergency fuel shut-off valve to provide access to the crew compartment and emergency exit
- 16) The aircraft must provide sufficient head room for a pilot-post position to walk upright throughout the passenger compartment
- 17) Two emergency compartments will be provided
- 18) Personnel-in-flight will be equipped with oxygen equipment for a minimum of 30 min. That equipment should be provided for the seating two or more large chairs that can be retracted into the floor
- 19) All equipment to be easily accessible with grouping accommodations for a minimum of two
- 20) At least one restroom will be provided equivalent in size and accommodations to those furnished on land present day aircraft
- 21) The rest room will be located between the cockpit and forward passenger compartment
- 22) An alternate galley will be provided between the rest room and the forward passenger compartment
- 23) AT galley counter must be located within the pressurized area and will be accessible to passengers and crew while in flight
- 24) AT galley counter will be close to the entrance to provide access to the aft passenger compartment
- 25) AT galley counter must be provided to replace the standard galley, and additional emergency electrical supply, rather than the use of an auxiliary power source, for the use of the bank project
- 26) The aircraft must be able to



### External fuel tank

fastenings designed to simplify field assembly and maintenance

These are the largest external fuel tanks ever designed and built for an aircraft—the Boeing B-47A jet bomber. Their design (by Ryan Aeronautical Company) incorporated the idea of a three section tank with nose and tail sections to rest within the center section for shipping. A quick, sure method of fastening the three pieces together in the field was imperative.



ESNA® developed a special semicircular gong channel ring which provides a 35° hot molten, molting flow to quickly locate the three antennas together with ELASTIC STCOP® units. The channels are riveted to the standard rings at each end of the center section. In the field, when simply thrown up in the air, the antennas are pulled to each other and tied together. The ELASTIC STCOP units are self locking, vibration-proof and maintainable. They are furnished with built-in locking inserts which are not subject to deterioration when immersed in fuel and which have specific service approval for use in petroleum tanks. Many companies report a considerable time and labor saving in fabrication of the tank, as well as in assembly and disassembly.

back in 1984 the general opinion is your current funding problem...the city going bankrupt...designed the West

## MAIL COUPON FOR DESIGN INFORMATION

Sept 1941 426, Shell's Soap Mfg Corporation of America  
Post Norwalk Road, Union, New Jersey

Please send me the following free literature information:

- ☐ This is my real business ☐ Here is a drawing of my product
- ☐ Reference back of business position ☐ Where will I be selling? How many do you suggest?

Index	File
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

File \_\_\_\_\_

**Figure 1** *Estimated probabilities of a child being in the top 10% of the income distribution by age and sex*

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_





## X-Y PLOTTER AND RECORDER



### RECORDS TWO INDEPENDENT VARIABLES FROM ANALOG OR DIGITAL INPUTS

A compact, desktop unit designed for general purpose graphics recording/monitoring of digital inputs with stand-in La Trobe converter or special modulators designed to customer requirements. Unique pen travel, fast and dependable, full chart versatility allowing curve generation to be achieved in all ranges. Wide for detailed viewing information.

Modulated and digitalized  
analog recording, digital  
conversion, dual value  
vertical and horizontal.

Computer test device

# LIBRASCOPE

LIBRASCOPE LTD., 10000 W. 10th Avenue, Suite 100, Denver, CO 80202



"I NEVER TRUST  
SURPLUS ACCESSORIES"

Save **At Whisked**  
**AIR SERVICE CORPORATION**

"I know that all surplus accessories have been through several hands for at least nine years. They must have deteriorated during that time. The military goes up and the later 1000 LBS is hard to keep. I wish only factory new parts and all the latest modifications for me—its AIRCRAFT Overhead Access 30000 study 1000"

AIR SERVICE CORPORATION is the **Official** supply companies in the world. We're responsible for maintaining the highest quality on their fleet of over 30 planes.

**Airwork**  
SERVICES  
BOSTON, MASS



NEW YORK MIAMI WASHINGTON

Selling Aviation  
to America's Groundlings!

1954  
**NATIONAL  
AIR  
PAGEANT**  
AUGUST 7-8, 1954  
Curtis-Wright Airport  
MILWAUKEE, WIS.

Two opportunities to sell aviation to the one thing public is asked for the National Air Pageant—the air show designed with the groundlings in mind!

Two full days of air activity and continuous ground exhibit until Air Pageant the label clear ones for aviation aviation.

Safety, economy, speed, and the ease of flying are stressed in every phase of the Air Pageant—a show of Air Force!

Two exhibits can be a part of America's future are significant.

Just write to:  
**Air Fair Division,  
Air Pageant, Incorporated  
9385 W. Appleton Ave., Milwaukee**

happened? Why? What can be done to prevent its happening again?

I suspect there has been a kind of misinterpretation which has led to a situation in which beyond the point a passenger is entitled to expect. The CAB, the CAA, and the airlines are all involved, and the most disconcerting evidence some of them clearly are the results it will inevitably lead to. The misinterpretation was the notion showing the removal of transit communication from transport aircraft in double country and over ocean flying.

Communication breakdowns prior to modern times are the result of a single catastrophe involved. Investigation reports reveal that cockpit are usually overwhelmed by a series of events. Radio time spending functions. It's not the pilot and captain of the DC-8 were desperately occupied with controlling the aircraft. There couldn't have been anything with the radio. A second communication whose purpose, responsibility is usually communication would have interrupted more time of the low time of the cockpit. He would have helped several another one like it. At least before passengers would have passed something. As it was everything was left late and later.

No addition to the lack of knowledge of transport flying was gained in this Transamerica crash. It was the same with the TWA crash in the people of South America. It may be the same with other flying the North Atlantic without transit communication. And in an industry given daily into through data accumulated largely from tragic accidents too. This should leave behind.

In the final analysis the passenger pays for his safety. To show him with the pay. "O.K., how much is he willing to pay?" does not stop the fact that he has little choice in the matter. He either takes it or leaves it on the calculated risk basis of the air crisis, personally concerned in the CAA and the CAB.

I believe the CAB should thoroughly review its policies and that of the CAA transit communication is an essential to transportation. Particularly over double country and over ocean passenger service. Don't forget safety and human lives in the economic race to carry all the unsupervised people who choose to travel by air.

James Macgregor,  
Chicago Ground Pilot,  
in Charge Communication  
Operation Area  
Chicago 14 11

## Praise

The article by Phil Kim in "electronics" in *Aviation Week* May 2 (p. 42) was an interesting discussion of the subject. I began to look for electronics production, which has been lacking at the same, may find the use of automatic devices a greatly simplified requirement over the 40-year-old manual method. It will be wonderful also for military production on will have a means of greater automation than that of similar types of equipment can be placed into service earlier.

A S-Space Special Air to  
Director of Eng. Research  
Stanford Research Institute  
Stanford, Calif.

## HEADSTART ON TOMORROW

Bendix maintains its traditional leadership in aviation by preparing today for tomorrow's engineering demands.

From this new Bendix Division Engineering Building will come new developments in hydraulics, electro-mechanics, and airborne radar. It is the first and in Pacific Division's long range engineering program, representing the newest and one of the most complete development facilities in America.



**PACIFIC DIVISION • Bendix Aviation Corporation**  
1740 Shattuck Way, North Hollywood, California

Call Bendix 1000 • Expert Service • Special Information • Bendix Division 1000 • Bendix Division 1000



NAVY



NAVY



NAVY



NAVY



NAVY



NAVY



NAVY

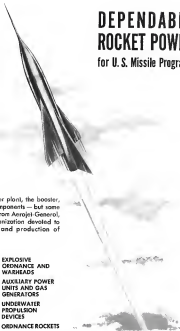


# DEPENDABLE ROCKET POWER for U. S. Missile Programs

It may be the prime power plant, the booster, or one or more of the components — but some part of it probably came from Aerojet-General, the nation's leading organization devoted to research, development and production of rocket power.

- SOLID- AND LIQUID-PROPELLANT ROCKET POWER PLANTS FOR AIRCRAFT AND MISSILE APPLICATIONS
- ELECTRONICS AND GUIDANCE
- ARCHITECT-ENGINEER SERVICES
- EXPLOSIVE ORDNANCE AND WARHEADS
- AUXILIARY POWER UNITS AND GAS GENERATORS
- UNDERWATER PROPULSION DEVICES
- ORDNANCE ROCKETS

**Aerojet-General CORPORATION**  
A SUBSIDIARY OF THE GENERAL TIRE & RUBBER COMPANY  
AZUSA, CALIFORNIA • CINCINNATI, OHIO • SACRAMENTO, CALIFORNIA



## FINANCIAL

### If Transportation Tax Is Eliminated . . .

#### And Passenger-Miles Increase This Much . . .

	5%	7½%	10%	15%
<b>It Will Mean This . . .</b>				
	(In millions)			
Increase in operating revenues <sup>1</sup>	\$36	\$51	\$68	\$102
Increase in net income after taxes <sup>2</sup>	17	25	34	51
Increase in federal income taxes <sup>3</sup>	17	25	34	51
Net loss to government in total <sup>4</sup>	83	75	66	49

<sup>1</sup>Using 1955 as a base. This projection is based on the following assumptions: (1) Railroad receipts will tend to be unchanged because of expansion; (2) added revenues will be divided equally between airlines, bus, and common carrier (taxes); (3) Airways, of course, will see other existing competitive relations among the different modes of transportation.

<sup>2</sup>Source: Interstate Commerce Commission, Bureau of Transport Economics and Statistics.

## What Travel Tax End Could Mean

With very little doubt, the reduction of the federal excise tax on passenger transportation from 1955 to 1975 would add about \$1.5 billion to the nation's gross product in the next year.

The air transport industry would see complete removal of the passenger tax and now be expected to point to this as the major benefit. The entire elimination of this tax would mean a great deal, in view of increasing profit margins that result from this tax.

Double-headed arrows pointing in opposite directions, the end of the tax can prove a significant stimulant to the travel industry.

Or, this ending can serve as a "fresh start"—enabling the airlines to remove their passenger fare schedules to help passengers for the trend of rising operating costs. Airline fares have remained static at a low level and, in some instances, even have been reduced while other transportation services have increased rates in keeping with cost trends (Aerobus News, Dec. 21, 1955, p. 14).

ICC Study—What will be the actual effect of reduction or elimination of the excise transportation tax? This matter is mentioned in a current review issued by the Interstate Commerce Commission's Bureau of Transport Economics and Statistics.

Taking results for all forms of carriers for 1952 (the most recent year for which complete data is available), the ICC study shows that the airlines generated some \$180.4 million in excise passenger taxes or 7.0% of the total of all carriers. Railroads, Class I, II, and III combined, generated \$104.7 million or 3.0% of the total.

In evaluating the effect of the reduction of the tax from 1955 to 1975, the report shows that "any increase in traffic that might develop appears as likely to be realized. At least it would seem likely that the effect will be less than one-third of that resulting from a complete removal of the tax."

Effect on Net Income—The ICC study also projects the effects of the tax's elimination on net income of the various carrier groups, for various specified increases in passenger miles. The projections, for the airlines only, are presented in the accompanying table. It's based on 1955 results. The calculations are:

• That increased volume will lead to an increase in operating expenses.  
• That the added revenues will be divided equally between increased income taxes and increased by the carriers.  
• That removal of the tax will not change existing competitive relations among the different modes of transportation.

No allowance is made for savings, which may be expected to be substantial, which they would obtain on being released from the necessity of collecting the tax.

It is evident that the increase in revenue passenger miles adequately com-

pany considerable increase in savings. Whether considerable savings would result if the complete elimination of the transportation tax were passed on to the consumer is difficult to ascertain. There is no doubt, however, that it would be a factor.

Certainly, the government would not suffer a total loss with the cessation of the transportation excise tax. It is a significant commentary that with each progressive gas tax, airline earnings would increase, with attendant increases in facilities also becoming larger. In other words, the airlines would share their increased earnings on a 50-50 basis with the government. The net result would still be that what might have been lost in some years would be largely recouped through income taxes.

Pass Tax Lost—Another approach still will revolve around finding another form to the extent that relief is obtained from the transportation tax aspect. The question of the level of this is becoming increasingly acute. Rising earnings in the 1957 third quarter and better deficit results in the first and second quarters for most of the transportation carriers may well force some action.

Present trends reveal that the domestic airlines will fall far short of meeting their 1955 aggregate net operating income of \$87.4 million (above from 1952's \$95.9 million) unless there is a material drop in traffic accompanied by better profit margins.

While net operating costs may be reduced somewhat under certain conditions, adjustments in the fare structure offer the best opportunity of covering the cost of operation. Elimination of the excise tax on first-class travel could add significantly to operating revenues.

Specific, fare modifications in the low fare line could help. Most important of all, considerable savings may be required to adjust basic coach fares.

Delayed Structure—There is an question that such schedules have been used on travel services, considerable. But this type of service has now been expanded by all carriers that it has diverted important volume from first-class schedules to the second class of the carriers. Experienced travelers report that the type of accommodations available on the two classes of service do not differ enough to warrant the wide fare differential between them. In other words, while the low structure has been debated, never has not.

In any event, the 5% reduction in the transportation tax already an effect can provide an even more direct and rapid method any overall advance consequences to the consumer. At the same time this would provide a needed measure of relief to offset rising operating costs.

—Sally Altschul



Beyond the obvious fact that Corvus is the Dragon offers you a way of living judged by most as the epitome of success: the achievement of wealth, luxury and increasing success. In fact, the Corvus Engineering Department offers you challenges found in few others.

It is, we believe, no "exploitant" engineering department—increasing, energetic, explorative — with the diversity that means security for people concerned.

*As proof, consider this:* Compare the two open and flow the world's two major airports, the two major airports — engineered and built the world's biggest transport, the world's two largest high-performance airports of the world.

**Opinion:** Coors's B-34 is the world's largest opera and bombing. Coors's B-34 Liberator with World War II's most powerful heavy bomber. Coors's XP59-1 holds the world's influence record for influence growth.

Walter H. T. BROOKS, Engineering Personnel  
Department 300

# CONVAIR

3302 PACIFIC HWY

in beautiful San Diego, California



**ENGINEERING  
OPPORTUNITIES**

with world's leading producer of  
light commercial airplanes

Two

- Design Engineers
- Design Draftsmen
- Research Engineers

Sand Resumes to  
Employment Manager  
CISNA AIRCRAFT CO  
WICHITA, KANSAS

Outstanding opportunities  
are available for

## Design Aerodynamicists

In the development of  
new types of Carrier-Based  
Aircraft with the  
COMNAVSTA DIVISION of

North American Aviation, Inc.

Sampling for nematocystids with Bagli-  
moring Dredge that is used or used in  
periods is short nematocystid analysis  
Researcher's interest in the study is:

- **FOOTWEAR DESIGN**
- **SHOES RECONSTRUCTION**
- **PRODUCTION PRODUCTS**

Write for *Information Appointments to*  
Engineering Personnel Office  
00004583 00000004

**NORTH AMERICAN AVIATION, INC.**  
4800 E. 91st Avenue • Colorado Springs, CO 80920

## OPPORTUNITY

Articles of firm consent to management and give the structure of all proposals for capital, revenue, and any gradually rising currency in savings (3).

1. MECHANICAL ENGINEER (or  
personnel manual and components for  
ships. Also possibility to function  
on project contract)

denza degli studenti iscritti per sesso e per regione.

For Beginners . . .

*Clear Horizons* **ahead**

... at Goodyear Aircraft Corporation

**BUILD YOUR CAREER** and help build tomorrow's world with the pioneer and leader in lighter-than-air craft. There's a clear, bright future at Goodyear Aircraft for engineers with talent, initiative and ambition.

**FORCEFUL, CREATIVE THINKING** is the key to Goodyear's progressive research and development programs in missiles, electrical and electronic systems, servomechanisms, new special devices and fiber resin laminates. Design and development engineering opportunities are many and varied - are now available to capable and imaginative men and women in the full of airports, aircraft and aircraft components.

POSITIONS ARE OPEN in several fields with salaries based on education, ability and experience.

- |                        |                      |
|------------------------|----------------------|
| Physicists             | Civil engineers      |
| Mechanical engineers   | Welding engineers    |
| Aeronautical engineers | Electrical engineers |

Openings also exist for personnel with ability and experience in technical editing and writing, art, and motion pictures.

AKRON, HOME OF GOODYEAR AIRCRAFT, is located in the lake region of northeastern Ohio. Cosmopolitan living, year-round sports and recreation, cultural and educational advantages make this thriving city an ideal spot for a pleasant home.

**THE TIME TO PLAN A CAREER IS - NOW!** Write, giving your qualifications, or requesting an application form.

C. G. Jones, Safety Personnel Department

GOODYEAR AIRCRAFT CORPORATION  
AKRON 15, OHIO







## Aircoach Seen Best Cure for Profit Sag



FOR COACH: TWA CONNIE



... AA DC-6 ...



... UAL DC-6 ...



... AND EAL SUPER CONNIE.

• Carriers hope to get more of mass market.

• Revision of fares also is held desirable.

By Frank Shaw, Jr.

U-S domestic airlines are continuing to push coach service to record proportions in an effort to strike a favorable balance between operating revenues and rising operating costs.

Airlines, on the whole, feel that the low-fare service is one of their biggest weapons in competing for the mass travel market.

Although fastidious revenues were down, with rapid coach expansion considered a partial cause (Aeronautics Week May 17, p. 101), carriers look for heavy volume coach traffic to be a big factor in keeping them in the black for the year.

► **Passengers & Profits**—This will not be the complete solution to the problem of sagging profits, but it should go a long way toward stimulating demand traffic. Some carriers seem to feel that before reasonable margins of profit can be realized, a general revision of the fare structure, both first-class and coach, is necessary.

But this will take time. For the present, coach is considered the most important remedy for the majority of airlines. Others are not quite so sure, but have been forced to follow the precedent for competitive reasons.

Because the Big Four domestic carriers usually are considered an accurate barometer of industry trends, Aeronautics Week conducted a survey to see how they line up on coach.

► **American Airlines**—American flew 147,587,000 coach seats versus passenger seats during the first quarter this year, an 84.7% increase over the same period last year. Total coach seat miles flown jumped 135.1%, while load factor decreased from 52.3% to 64.3%.

To provide this amount of service and carry that amount of traffic, AA flew 170% more aircraft miles in the first three months of 1954 than in the first three months of 1953. Number of coach passengers carried was up 135.1%.

American points out that length of haul has been decreasing slightly, since more cities now are being served by coach. In addition to the four daily transcontinental flights operated in the first quarter of last year, AA has added



## HAPPY LANDINGS!

When passengers lean back and enjoy the ever-new thrill of landing — it's a matter of trust... trust in the alert skill of the pilot... trust in the strength and precision of the big plane. To build this confidence, aircraft producers and parts manufacturers generally use Ostuco heavy wall tubing for axles, landing gears, engine mounts, fuel lines, and many other vital aviation parts. If your product requires seamless tubing, formed or fabricated, send us your blueprints for prompt quotation. Latest edition of Ostuco A-2 Handbook is yours upon request.



*Always Specify Ostuco Tubing*

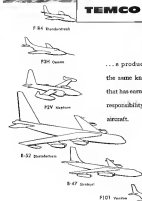
**OHIO SEAMLESS TUBE DIVISION**  
of Commercial Steel Company • CLEVELAND, OHIO  
Subsidiary of the American Steel & Tube Institute in America

SEAMLESS AND  
ELECTRIC WELDED  
STEEL TUBING  
—Fabricating  
and Peeping

SALES REPRESENTATIVES: BIRMINGHAM • CHICAGO • CINCINNATI  
COLUMBUS • DAYTON • DETROIT • INDIANAPOLIS • KANSAS CITY  
LOS ANGELES • MILWAUKEE • MINNEAPOLIS • NEW YORK • PHILADELPHIA  
PITTSBURGH • ST. LOUIS • ST. PAUL • ST. PETERSBURG • TAMPA  
TULSA • WASHINGTON • WICHITA • WILMINGTON • WYOMING  
CANADA: GILBERT & ROYCE LTD., LTD.  
BRITAIN: COMMERCE LTD., INTERNATIONAL COMPANY  
S.T. 1307 • Street, New York • New York



**TEMCO Model 33**



**PLEBE**  
MILITARY TRAINERS

... a product of  
the same know-how and experience  
that has earned TEMCO recognition and production  
responsibility on six of the nation's foremost military  
aircraft.



a local flight from New York to Los Angeles by way of Detroit, Chicago, Tucson, Houston and San Diego.

The airline now operates a daily coach flight from Kansas to Los Angeles by way of Buffalo and Chicago, and has negotiated direct service from Chicago to Mexico City. Another flight has been added between New York and Oakland on the way of Washington and Dallas, with additional Delta-Los Angeles service.

American's experience has shown, according to president C. R. Keady, that enough of a touch more seasonal demand catches travel with a high peak in summer. AA has found that long and wide schedule coach service is profitable, though not, but the airline's short-haul operations are unprofitable.

The long-haul service attracts passengers, he points out, but attraction of new business on short-haul operations is negligible. He adds that there is no evidence of widespread diversion from first-class service, although there is a profit margin.

The AA chief is not moving to the industry is that season can contribute more as well as profits and it is a "good" season.

► **Trans World Airlines-TWA**, a profit almost as secure and with good results. Domestic coach traffic alone jumped 36.9% for the first quarter over the same period last year, and last month coach traffic exceeded that of first-class for the first time.

Last year, TWA flew 1,617,794,000 passenger miles in domestic operations. This year, a gain of at least 10% is forecast. Of approximately 46 flights a day being operated, nearly 40 domestic routes, 25 of them, or more than 60%, are coach flights.

At present, about 60% of the airline's long-haul (two-engine) domestic passenger traffic is coach. And the trend is upward. TWA officials expect "Air coach is definitely the segment of our operations where the greatest business expansion is being experienced," says a spokesman.

► **United Air Lines-UAL**, an airline as not being a virtual supporter of aircoach, has nevertheless increased traffic gains in low-fare operations. United went through the first quarter of 1955 with DC-4 aircraft for coach operations, and did not introduce DC-6 tourist service until April 1955. Consequently, last 1954 shows a tremendous increase over the first four months of last year.

The current first 250 million domestic coach passenger miles in the industry in the period from January through April of this year, representing an increase of 13.6% over the same period for 1954. Available statistics were up 15.5%.

Also, for the first four months of this year, UAL's coach service accounted for about 25% of its entire revenue pro-

gresses and about 20% of total available seats.

On the whole, UAL's coach service is not going to be a major factor in other airlines. One big reason is that the airline's president, W. A. Patterson, is not pushing it. He admits UAL has been forced into a field that he does not consider profitable as yet.

Patterson still is a staunch supporter of first-class service over coach, firmly believing there has been strong division of first-class traffic as a result of the lower fare operations. (Aviation Week May 17, p. 18). His big argument is with the fare structure, holding that the 10% differential between first-class and tourist rates is inconsistent with the difference in quality of service offered.

This spread, says Patterson, should be reduced to 15% or 20%, principally by raising coach fares. To increase first-class fares, direct short-haul service to attract, he argues. ► **Eastern Air Lines-EAL's** board chairman, Capt. Eddie Rickenbacker, firmly believes the key to airline profits lies in coach operations.

Last year, Eastern's coach service attracted less than a fourth of its total operations. But this year, acting on the airline trend, EAL decided to set the pace. (Aviation Week May 16, p. 9)

## Hostile Senators Hit CAB Actions

By Katherine Johnson

Civil Aeronautics Board Sen. James Eastland, Miss. (D), has introduced legislation to obtain a \$75 million appropriation to fund airline subsidies in fiscal 1955. Senate action has reduced the request to \$60 million.

The subcommittee chairman, Sen. Styles Bridges, also chairman of the full Appropriations Committee, declined that the group was pending the report of the Air Coordinating Committee, as approved by the President, as a guide post in acting on the appropriation. His report recommended elimination of unprofitable domestic and international airline services and subsidies.

The subcommittee reported the Board's handling of these cases. ► **U.S.-Mexico case.** Louisiana's Sen. Allen Ellender charged that Pan American World Airways and American Airlines successfully have obstructed the entry of their other certificated lines into Mexico City-Kan. Air Lines, Brazil Airways and Western Air Lines. He said the State Department has concealed evidence to support his charge.

His key question: Why was the "national airport" of a New Orleans-Mexico City route awarded to Los Angeles-Mexico City route

On May 16, approximately half of the airline's total service was reported to second, with plans for addition of still more flights to meet tourist flights to the mainline ports of summer schedules.

By the end of next year, Eastern's operations will be coach. Right now, the airline's daily aircraft carries in 4,072 passengers, with 3,250,000 coach seat-miles scheduled every 26 hours.

In the early days of season, current monthly converted ground-out first-class planes to coach service as new, larger and faster equipment was delivered. But now, with the big swing to coach operations, it has become necessary to reduce service aircraft in order to meet intense competition.

Most recent example of this was found in Delta-CAS Air Lines' inauguration of the first DC-7 service since Apr. 2, followed by Northwest Airlines' introduction of an DC-7 to coach operations between New York and Miami several weeks ago. (Aviation Week May 17, p. 10)

Eastern expects delivery in its first DC-7 service and whether Eastern's leader has announced that they will be used for first-class service only; there is industry speculation that he may change his plans to meet Northwest's challenge.

for Western Air Lines' travel down which a total of 17.5-Mileton agreement might be worked out, while FAA and American was presented to make unilateral arrangements with the Mexican government.

► **CAB member Oswald Rogers**, head of the 1946 deploration to negotiate a Mexican bilateral agreement and he did not know the answer.

► **Bridges case.** Subcommittee chairman Bridges was critical of the Board's failure to enforce through U.S. airlines from New York to the Bahamas and the west coast of South America, in view of the fact that British Overseas Airways Corp. and Colombian National Airways' agreement were authorized to operate their routes.

► **Northeast Airlines case.** Maine's Sen. Margaret Chase Smith declared that the Board's delay in acting on Northeast's application for service to Maine is prejudicial to New England's shipping effort as a consequence of an increase in the rates or confusion for a merger with Delta Air Lines. Northeast's application was filed in 1951. Despite Sen. Smith's contention that it is an "unreasonable case," CAB chairman Chase Corney reported it would set its terms for consideration, starting with a pre-arranged conference in the fall.

► **The Shell.** The only other member of

# New Opportunities FOR RESEARCH ENGINEERS

Fast-growing Stratos is developing new aircraft engine systems, turbojet drives, controls, and other parametric accessories for aircraft and industry. Positions are now being filled for investigations and studies in parametric refrigeration and very high speed power turbines.



Write to R. T. Burdick, outlining your qualifications for these interesting and challenging positions. Your correspondence will be kept in complete confidence, of course.



Wonderful recreational facilities  
Fine beaches—  
Fishing, Boating, Golfing.  
Excellent housing  
available in area. Convenient  
to New York City.



## STRATOS

A Division of Hamilton Engine & Machine Corporation

HAM SHORE, L. I., N. Y.

Manufacturers of air conditioning equipment and parametric noise systems for high speed aircraft.

the subcommittee to indicate an interest during the first week of hearings. Sen. Harley Kilgore, vice chairman of CAA's policy of granting authority to change federal income taxes to operating expenses. He mentioned that the memo that the subject "tax burden is shifted to the taxpayer." He made two points:

- In the case of subsidized carriers, the income tax burden is shifted by a subsidy, lessened by the general tax increase.
- In the case of unsubsidized carriers, CAA includes income taxes as "cost" in determining a "sanitized" mail rate, paid by the Post Office and financed by general tax revenue.

• **Carrier's Plan.** Kilgore said the subcommittee to allow the \$75 million requested for fiscal 1975, Kilgore pointed out that reductions in the calculation due to the Supreme Court decision requiring the effect of domestic yields against international actually and after further could be reflected in the fiscal 1975 report, on which the Board will appear before Congress early next year. The \$40 million allowed by the House was planned to cover subsidy payments at the passenger 50¢/lb. a month, very roughly February. Congress was dropped a supplemental bill to provide additional money for payments to the end of fiscal 1975 could be passed before mid-March. This, he said, would provide payments in February through March and "would be critical to those carriers which depend on prompt monthly payments to meet current operating expenses, including payroll."

• **Two Questions.** CAA's decision to require negotiations with Mexico on a bilateral agreement and reconsider the U.S.-Mexico route structure, it was developed at the Senate subcommittee hearing, must then get two questions: • Are Eastern, Braniff, and Western still committed to fly to Mexico? Former President Truman accelerated their certificate, granted in 1946, shortly before leaving office. But the presidential authority to revoke mail certificates is at issue and the Attorney General is questioning an opinion.

• Should the U.S. approach Mexico on a "close state" basis to reconsider PAA and American's established routes in "free" and simply aim to include more U.S. airline routes on a bilateral agreement? Ellender was emphatic in favor of the "close state" approach, which would put PAA and American together, as well as Eastern, Braniff, and Western competing for passengers. But CAA member Ryan commented: "I do not know how you could get the current cap."

• **1976 Budget.** The 1976 U.S.-Mexico decision, as approved by the President, granted these routes: • American, operating under a long-

term written-road certificate from Dallas/Ft. Worth to Mexico City. The carrier was given a permanent certificate.

- PAA, granted direct Houston-Mexico City service. Presently the carrier, under the "grandfather rights" provision of the 1976 CAA Act, operated only from Brownsville, Tex.
- Eastern, awarded a New Orleans-Mexico City route.
- Western, granted a Los Angeles-Mexico City route.
- Braniff, won Mexico City for its South American service.

• **Ryan's Report.** Ryan gave this report to the Senate subcommittee on the Mexican negotiations.

• Although content an exclusive Mexican airline service into Los Angeles and New Orleans at the outset, the Mexican government did agree to permit Western Air Lines to establish competitive service with Compañia Mexicana de Aviación and to have Eastern, as well as CMA, serve New Orleans-Mexico City.

• The negotiations broke down because of the Mexican government's unfavorable disposition to the extension of Braniff. "We were told that Braniff was very unpopular and its extension simply would not be possible," Ryan reported. "The Mexicans felt that a Mexican subsidiary, Aerovias Braniff, would be required if the parent can pay more."

Ellender asked: "Do you think the efforts of CMA (10% owned by PAA) had anything to do with the breakdown of the negotiations?"

Ryan: "I wouldn't say they were not operating under cover, but I have no evidence they were." As to profile PAA passes through CAA, Ryan remarked: "Officials of PAA will always be at a position to exert influence through friends they have in Mexico."

Ellender: "You do know that PAA and American were opposed to the study of other carriers into Mexico City?"

Ryan: "I have no doubt of that. The carrier who seeks to get in a ship is in favor of competition and the carrier who is in a favor of competition is not at that instance."

Ellender: "Have you any doubt that PAA and American get preferential treatment?"

Ryan: "I have no evidence. . . . That may be entirely true."

## Qantas Takes Over BCPA Pacific Route

Qantas Express Airways, Ltd., was scheduled last week to begin flying its new route between Australia and North America. Civil Aeronautics Board and President Eisenhower, the week previous approved the transfer to QEA of British

# "BTO"

-but every hit direct!  
using RCA SHORAN

"BOMBER THROUGH OVERCAST?" Yet RCA SHORAN can determine your position "over target" to an accuracy of better than 50 feet in 100 miles or more—and do it in less than three seconds of time in light!

Developed by RCA for the Air Force to aid blind bombing during World War II, SHORAN is helping to set outstanding records for pinpoint accuracy under conditions where visual bombing would be impossible.

Just one example of how RCA is working with our Armed Forces to assure U-S supremacy in electronic equipment.

You, too, can help our Armed Forces keep our country safe. The U-S Air Force urgently needs men and women volunteers to spend many months—more Air Defense filter centers—do the many jobs as part of the Air Defense team. 200,000 patriotic Americans are serving. 200,000 more are needed.



JOIN NOW! Contact your nearest local Civil Defense Trainer or write to:  
General Observer Corps, P. O. Box, Washington 25, D. C.



**RADIO CORPORATION OF AMERICA**  
ENGINEERING PRODUCTS DEPARTMENT  
CAMDEN, N.J.

## Snap-on Tools help build



### Navy Sub-Hunter by BELL



Compact... long range... with folding blades for handling on small carriers or cruisers... the new Bell XH51-1 is the most powerful tandem-rotor helicopter yet produced. In assembly departments of Bell's Helicopter Division every operation calls for workmanship of the highest accuracy. Almost without exception Snap-on Tools are used by Bell's skilled workers. Everywhere in aviation Snap-on tools see the overwhelming choice for manufacture and maintenance. Snap-on provides direct service through factory branch warehouses in principal aviation centers. Write for complete catalog of more than 4000 Snap-on hand and bench tools.

**SNAP-ON TOOLS CORPORATION**  
3320-G 9th Ave., Kenosha, Wisconsin

\*Snap-on is the trademark of Snap-on Tools Corporation.



Commonwealth Pacific Airlines designs its current program.

CIA will operate Lockheed Super Constellation between Sydney, New Providence and Vancouver, British Columbia. The airline ordered seven Super Constables last year (Aeronautics Week Apr. 22, 1951, p. 32) in a \$15 million re-equipment program.

The route approved in March Sydney to New Caledonia, the Fiji Islands, Canton Island, Honolulu, San Francisco and Vancouver. Two flights will be made weekly between Sydney and San Francisco. Three of these flights will be extended every two weeks to Vancouver.

### TWA Seeks to Plug Overseas Route Gaps

Trans World Airlines wants to close two gaps in its present overseas system, which could impede its international schedule, the airline told Civil Aeronautics Board last week.

The airline said for:

- Extension of its Far Eastern route from India and Ceylon to Bangkok, with an extension to Tokyo where it proposes to link with trans-Pacific services of Northwest Airlines.
- Route between Frankfurt, Germany, and Zurich, Switzerland.

A brief filed with the Board last week points out that TWA's continued operation on the Far East and acute competition in Tokyo could see the proposed money in three ways:

- Its international mail pay will be reduced through additional traffic carried over its existing international route.
- NWA's economic position will be improved by providing it with a non-competitive connecting service.
- Schedules parallel to Pan American World Airways will be reduced through extension of a "competitive schedule" to the area and increase in traffic which competition service produces.

"The Board and the President in considering Pan American, TWA and Northwest in that area in 1946," the brief states, "imagined the desirability of having two transoceanic round-the-world routes in operation through the Far East. The very reason that motivated the 1946 decision for these two routes is that area as today the more compelling."

Delaware Fichman-TWA also points out the "transoceanic operation of the Far East to the U.S. today, as indicated by U.S. proposals for a South-east Asian mail route arrangement, applied equally to the need for transoceanic mail service through the highly strategic area.

Warner Lee Thomas, board chairman

of TWA, and as a CAB hearing last week that West Germany's acceptance as an economic and industrial power makes it important for the U.S. to provide "integrated air service" not only to Germany, but beyond.

The case built to close, he told the Board, by providing TWA to close the 175-mile gap in its overseas system between Frankfurt and Zurich. This would eliminate the inefficient stop-over which TWA now operates from Shannon, Ireland, through London to Frankfurt, Paris and so on.

E. O. Cooke, TWA vice president, points out that if the Frankfurt-Zurich route were direct, TWA, London stop-over passengers could remain on TWA all the way to Rome and beyond to Frankfurt. The resulting traffic profile opportunities for TWA would have significant bearing on its own security requirements, he said.

### Mohawk Starts S-55 Operations June 5

Mohawk Airlines will begin helicopter service between metropolitan New York City and Albany/Mountville, N. Y., June 5, making introduction of capital service over routes originally established for fixed-wing operations.

The carrier took delivery of a Sikorsky S-55 last month (Aeronautics Week May 5, p. 7). "For the present, this one aircraft will be the extent of our helicopter operations," Mohawk president Robert K. Peck notes.

The route will make two roundtrips daily between New York (N. Y.) Airport and Albany to provide service both ways in the morning and late in the day for commuting businessmen. Round-trip time between the two points should be less than an hour, says Peck.

The Liberty Mountain area is one of the designated points on Mohawk's routes, but up to now service has not been extended due to lack of an airport adequate enough for DC-3 operations.

### SHORTLINES

► British Overseas Airways Corp. has its assigned over-seas first-class service between New York and Manchester, England. Flights will be operated with Boeing Stratojets.

► Trans World Airlines flew 42,699,300 miles last month, an increase from last month, almost 7% more than April of last year and nearly 67% more than the same month the 1950.

### NORTH AMERICAN F-100 SUPER SABRE



## keeping the SABRE sharp

A low drag, ultra-streamlined fuselage and razor-thin, sweptback wings helped this North American F100 Super Sabre set the present world's speed record for the U.S. Air Force—755.149 M.P.H. On the Super Sabre's sleek surface, Camloc quarter-turn fasteners hold many access panels and doors flush, tight and secure.

One more instance of Camloc dependability!



# CAMLOC

**FASTENER CORPORATION**  
23 Spring Valley Road, Paramus, N. Y.

WEST COAST OFFICE: 800 MILLER BLVD., LOS ANGELES, CAL.







BOEING 707, With KC-96 in Background

## Boeing's Achievement

Boeing has turned out America's first jet transport at a speed unprecedented in aviation history.

Work progressed so rapidly on the Model 707 that the company's U. S. competitors actually halted work on their own projects to await results in Seattle.

The response actually exceeded its original tight production schedule by two months. In aviation this is a remarkable achievement.

The first aircraft of its kind this side of the Atlantic is more than an outstanding technical accomplishment. It symbolizes a financial policy at Boeing that is of paramount importance to the American taxpayer. Boeing dipped into its own reserves to the extent of at least \$25 million to build the 707, which may become a military tanker, a military personnel transport, a commercial tanker or all three.

As one of the company's own officials put it recently, "A major problem today is how to build and sustain an adequate defense without imposing too great a load of public expenditure in terms of taxes and public debt. The Boeing Airplane Co. is one of the largest contributors to the government in the national defense program. We are highly conscious of our responsibility for efficient and economical use of public funds."

In the past 12 years Boeing has increased its income 70% at its net profits, although the net profit has been less—about 2% of total income from sales—about 5% to 6% for industry generally, after taxes.

There seems to be a stronger incentive in America than the profit motive. Two percent profits and enough built the 707. Free enterprise, confidence, efficient management built the 707 in record time. No behind hands, but also no cravenness, greediness and type and delay.

In an industry which has elbowed a growing economy with bureaucratic interference and distortion in complex design, equipment and production procedures demanded in future years as a significant bond in the trend toward ever greater governmental direction and less and less industry freedom in aircraft design and development.

Government, and national defense, need desperately the ingenuity, brains, and know-how of America's air-

craft industry. The industry must be assured profits adequate to spur competition and enterprise. Such enterprise is reflected in Model 707 and speed aircraft development at this crucial time in our history.

## Lesson in Bureaucracy

The London Daily Express recently presented a site in British government and aviation circles with a comparison between Britain's government-owned and operated British Overseas Airways Corp and the American World Airways.

To operate 38 aircraft, BOAC had 17,471 employees on a recent date, whereas Pan American was operating 132 planes with 17,500 employees.

The writer noted that in 1953 BOAC carried 239,174 passengers, while FAA flew 1,678,000.

"The comparison shows a dreadful disparity in operation—a startling extravagance, for example, in the number of BOAC workers to each plane," Group Capt. Hugh Dennis wrote. "The men who run the big privately owned airlines in this country say they would welcome the opportunity to take over the BOAC routes."

## Small Firms Serve Too

In this day of multi-billion dollar budgets, spectacular achievements of our great aircraft companies and government military and research agencies, the aviation press is tempted to forget or neglect deeds and sacrifices made by the small firms in the industry. Aviation owes them much.

Stanley Aviation Corp. is such a company. It began its rise less than 10 years ago in an obscure basement in the Buffalo area. Today it has about 900 employees; its president, Robert M. Stanley, has just completed his sabbatical of establishing two scholarships at the University of Colorado totaling \$5,000 annually.

Then it registered its first scholarship in later interest in the engineering and professional students in the area where it is building a plant, adjoining Deere's Stapleton Airport.

"We hope to contribute our lay but to establishment and preservation of high professional and educational standards," Mr. Stanley writes.

This progressive firm and other small companies with similar demonstrations of a desire to do an substantial betterment in deserving of recognition, and American West will be pleased to hear from all firms which sponsor scholarships. We salute the Stanley spirit.

## Are Pilots Bad?

Scientists in a NATO military group the other day were eagerly anticipating replacement of the pilot in aircraft with subordinates and servo-mechanisms, according to the New York Times and Boston Week.

"Where," pilot Scott Crossfield finally asked them, "can you find another mechanism sensitive enough to weigh only 150 lb. and having good adaptability, that can be produced as cheaply as completely unskilled labor?"

—Robert H. Wood

# Can you use over 10,000 years of specialized experience?

... in research  
engineering  
manufacturing  
service



Bendix Products, South Bend, offers the most comprehensive experience in research, engineering, manufacturing and service, as well as testing, tooling, parts, wheels and brakes, to be found anywhere in the industry.

Bring your program problems to Bendix Products, and you have immediately, literally thousands of years of specialized and technical experience at your command—experience on all types of aircraft under all types of operating conditions.

Bendix Products' application of experience to your program parts with a research organization which has more than thirty years has concerned itself with anticipating tomorrow's needs.

Bendix Products engineering drawing is based on unmatched knowledge rather than on trial and error methods. Bendix manufacturing facilities have continuity both and are still being expanded for more efficient operation, supplying our production, thereby lowering cost to customers. Less has not meant, an efficient, world-wide Service Organization for all Bendix products is supervised by and from Bendix Products, South Bend, to assure the full performance originally built into all products. Why don't you put this specialized and technical experience to work on your specific planning programs, wherever test engineering, tooling, parts, wheels and brakes are requirements.

BENDIX PRODUCTS DIVISION SOUTH BEND *Bendix*  
Bendix is a registered trademark

South Bend, Indiana International Division  
100 East Third Street, New York 17, N. Y.

Past performance is  
the best assurance of  
future achievement!

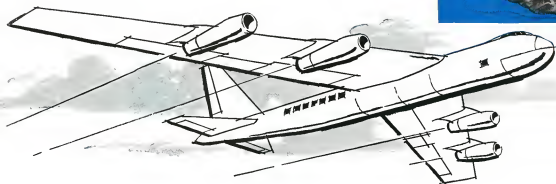
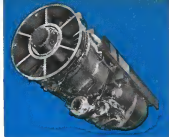


On perfectly easy and improved aircraft design, from the earliest designs to the present DC-7, Bendix specialized experience has played an important part in setting new performance records. For example, the Bendix Direct Fuel System contributes materially to the accomplishment of faster takeoffs and lower operating costs in the new DC-7. Also tested and produced Bendix instruments.

*Bendix  
Products  
Division*

*... less than 4 hours ...*

**BY JET TRANSPORT**



*... or Philadelphia to New York in less than 1 hour ...*

**BY HELICOPTER**



*it's a sure bet you'll be riding with*

**FOOTE BROS. AIRCRAFT-QUALITY PRECISION GEARS AND ASSEMBLIES**

Leading producers of aircraft engines and air frames look to Foote Bros. when they need precision gearing and mechanical drives. Foote Bros. pioneering experience in the field, large engineering staff and complete production facilities make them the logical dependable source. Call or write today ... Foote Bros. engineers are at your service.

**FOOTE BROS.**

*Better Power Transmission Through Better Gears*

FOOTE BROS. GEAR AND MACHINE CORPORATION

4545 SOUTH WESTERN BOULEVARD, DEPT. G1, CHICAGO 9, ILLINOIS